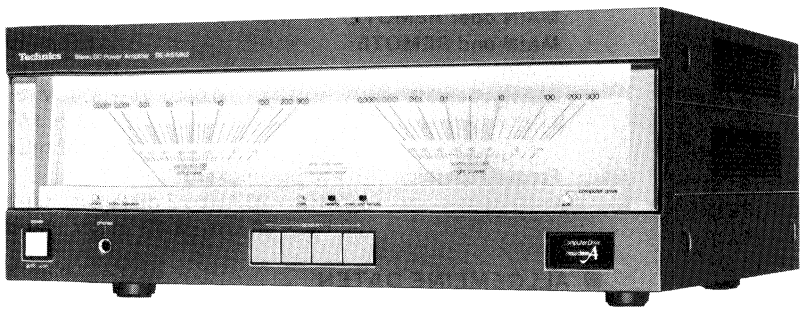
ORDER NO. HAD84062732C9

Service Manual

Computer Drive New Class A
Stereo DC Power Amplifier

Amplifier

SE-A5MK2



Color

(K) . . . Black Type

Color	Areas
(K)	[D] . . . . . Scandinavia
(K)	[EW] . . . . Switzerland
(K)	[EK] . . . . United Kingdom
(K)	[EF] . . . . France
(K)	[XA] . . . . Southeast Asia, Oceania, Africa, Middle Near East and Central South America.
(K)	[PE] . . . . European Military
(K)	[PA] . . . . Far East PX
(K)	[XL] . . . . Australia
(K)	[Ei] . . . . . Italy
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(K)	[EB] . . . . Belgium
(K)	[PC] . . . . European Audio Club
(K)	[EGA] . . . F.R. Germany

Please use this manual together with the service manual for Model No. SE-A5MK2 [M], Order No. HAD84032731C1.

SPECIFICATIONS

(DIN 45 500)

■ AMPLIFIER SECTION

20 Hz~20 kHz continuous power output
both channels driven 2 × 150W (8Ω)
2 × 150W (4Ω)

40 Hz~16 kHz continuous power output
both channels driven 2 × 150W (8Ω)
2 × 150W (4Ω)

1 kHz continuous power output
both channels driven 2 × 150W (8Ω)
2 × 150W (4Ω)

Total harmonic distortion
rated power at 20 Hz~20 kHz 0.002% (8Ω)
0.002% (4Ω)
rated power at 40 Hz~16 kHz 0.002% (8Ω)
0.002% (4Ω)
rated power at 1 kHz 0.002% (8Ω)
0.002% (4Ω)
half power at 20 Hz~20 kHz 0.001% (4Ω)
half power at 1 kHz 0.0005% (4Ω)
−26 dB power at 1 kHz 0.001% (4Ω)
50 mW power at 1 kHz 0.001% (4Ω)

Intermodulation distortion
rated power at 250 Hz: 8 kHz=4:1, 4Ω 0.002%
rated power at 60 Hz: 7 kHz=4:1, SMPTE, 8Ω 0.002%

TIM unmeasurably small

Power bandwidth
both channels driven, −3 dB T.H.D. 0.01%
5 Hz~100 kHz (4Ω)

Residual hum and noise 0.13 mV
Damping factor 50 (4Ω), 100 (8Ω)
Input sensitivity and impedance 1 V/47kΩ
S/N 108 dB (121 dB, IHF, A)
Frequency response
DC ~20 kHz, +0 dB, −0.1 dB
DC ~150 kHz, +0 dB, −3 dB
Channel balance, 250 Hz~6,300 Hz ±0.5 dB
Channel separation, 1 kHz 60 dB
Headphones output level and impedance 800 mV/330Ω
Load impedance
MAIN or REMOTE 4Ω~16Ω
MAIN and REMOTE 8Ω~16Ω
Meter
reading range 0.0001 W~300 W (8Ω)
−60 dB~+5 dB
(logarithmic compression)
frequency response (reading accuracy)
20 Hz~20 kHz ±2 dB (more than −50 dB)
20 Hz~20 kHz ±3 dB (less than −50 dB)

■ GENERAL

Power consumption 950W
Power supply AC 50 Hz/60 Hz, 110V/120V/220V/240V
Dimensions (W×H×D) 430 × 178 × 416 mm
Weight 18.4 kg

Note:
Total harmonic distortion is measured by the digital spectrum analyzer (H.P. 3045 system).

Specifications are subject to change without notice for further improvement.

Technics

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SE-A5MK2

■ TECHNISCHE DATEN

(DIN 45 500)

■ VERSTÄRKERTEIL

Dauerton-Ausgangsleistung bei 20 Hz ~ 20 kHz
beide Kanäle ausgesteuert 2 × 150W (8 Ω)
2 × 150W (4 Ω)
Dauerton-Ausgangsleistung bei 40 Hz ~ 16 kHz
beide Kanäle ausgesteuert 2 × 150W (8 Ω)
2 × 150W (4 Ω)
Dauerton-Ausgangsleistung bei 1 kHz
beide Kanäle ausgesteuert 2 × 150W (8 Ω)
2 × 150W (4 Ω)
Gesamtklirrfaktor
Nennleistung bei 20 Hz ~ 20 kHz 0,002% (8 Ω)
0,002% (4 Ω)
Nennleistung bei 40 Hz ~ 16 kHz 0,002% (8 Ω)
0,002% (4 Ω)
Nennleistung bei 1 kHz 0,002% (8 Ω)
0,002% (4 Ω)
halbe Nennleistung bei 20 Hz ~ 20 kHz 0,001% (4 Ω)
halbe Nennleistung bei 1 kHz 0,0005% (4 Ω)
−26 dB Leistung bei 1 kHz 0,001% (4 Ω)
50 mW Leistung bei 1 kHz 0,001% (4 Ω)
Intermodulationsfaktor
Nennleistung bei 250 Hz: 8 kHz = 4:1, 4 Ω 0,002%
Nennleistung bei 60 Hz: 7 kHz = 4:1, nach SMPTE, 8 Ω 0,002%
TIM (Intermodulationsverzerrung) unmeßbar
Leistungsbandbreite
beide Kanäle ausgesteuert bei −3 dB T.H.D. 0,01% 5 Hz ~ 100 kHz (4 Ω)
Restbrumm und Geräusch 0,13 mV
Dämpfungsfaktor 50 (4 Ω), 100 (8 Ω)
Eingangsempfindlichkeit und -impedanz 1 V/47 kΩ
Geräuschabstand 108 dB (121 dB nach IHF, A)
Frequenzgang
DC ~ 20 kHz, +0 dB, −0,1 dB
DC ~ 150 kHz, +0 dB, −3 dB
Kanalabweichung (250 Hz ~ 6300 Hz) ±0,5 dB
Übersprechdämpfung (1 kHz) 60 dB
Kopfhörerpegel und -impedanz 800 mV/330 Ω
Lautsprecherimpedanz
MAIN oder REMOTE 4 Ω ~ 16 Ω
MAIN und REMOTE 8 Ω ~ 16 Ω
Instrument
Anzeigebereich 0,0001 W ~ 300 W (8 Ω)
−60 dB ~ +5 dB
(logarithmisch)
Frequenzbereich (Ablesegenauigkeit)
20 Hz ~ 20 kHz ±2 dB (über −50 dB)
20 Hz ~ 20 kHz ±3 dB (unter −50 dB)

■ ALLGEMEINE DATEN

Leistungsaufnahme 950 W
Netzspannung
Wechselstrom 50 Hz/60 Hz, 110V/120V/220V/240V
Abmessungen (B×H×T) 430 × 178 × 416 mm
Gewicht 18,4 kg

Bemerkung:
Der Gesamtklirrfaktor wurde mit einem digitalen Rauschspektrometer (Anlage H.P. 3045) gemessen.

Spezifikationen Können infolge von Verbesserungen ohne Ankündigung geändert werden.

■ CARACTERISTIQUES

(DIN 45 500)

■ SECTION AMPLIFICATEUR

Puissance de sortie continue de 20 Hz~20 kHz,
les deux canaux en circuit 2 × 150W (8Ω)
2 × 150W (4Ω)
Puissance de sortie continue de 40 Hz~16 kHz,
les deux canaux en circuit 2 × 150W (8Ω)
2 × 150W (4Ω)
Puissance de sortie continue à 1 kHz
les deux canaux en circuit 2 × 150W (8Ω)
2 × 150W (4Ω)
Distorsion harmonique totale
à puissance nominale (20 Hz~20 kHz) 0,002% (8Ω)
0,002% (4Ω)
à puissance nominale (40 Hz~16 kHz) 0,002% (8Ω)
0,002% (4Ω)
à puissance nominale (1 kHz) 0,002% (8Ω)
0,002% (4Ω)
à demi-puissance (20 Hz~20 kHz) 0,001% (4Ω)
à demi-puissance (1 kHz) 0,0005% (4Ω)
puissance de −26 dB à 1 kHz 0,001% (4Ω)
puissance de 50 mW à 1 kHz 0,001% (4Ω)
Distorsion d'intermodulation
à puissance nominale à 250 Hz: 8 kHz=4:1, 4Ω 0,002%
à puissance nominale à 60 Hz: 7 kHz=4:1, SMPTE, 8Ω 0,002%
TIM (distorsion d'intermodulation transitoire) infiniment petite
Réponse de fréquences
les deux canaux en circuit, −3 dB T.H.D. 0,01% 5 Hz~100 kHz (4Ω)
Bruit et ronflement résiduels 0,13 mV
Coefficient d'amortissement 50 (4Ω), 100 (8Ω)
Sensibilité et impédance d'entrée 1 V/47kΩ
Signal/Bruit 108 dB (121 dB, IHF, A)
Réponse de fréquence
DC ~20 kHz, + 0 dB, −0,1 dB
DC ~150 kHz, + 0 dB, −3 dB
Equilibrage des canaux, 250 Hz~6,300 Hz ±0,5 dB
Séparation des canaux, 1 kHz 60 dB
Niveau de sortie des casques et impédance 800 mV/330Ω
Impédance de charge
PRINCIPALE ou AUXILIAIRE (MAIN or REMOTE) 4Ω~16Ω
PRINCIPALE et AUXILIAIRE (MAIN and REMOTE) 8Ω~16Ω
Indicateur
gamme de lecture 0,0001 W~300 W (8Ω)
−60 dB~+5 dB
(compression logarithmique)
réponse de fréquence (précision de lecture)
20 Hz~20 kHz ±2 dB (plus que −50 dB)
20 Hz~20 kHz ±3 dB (moins que −50 dB)

■ DIVERS

Consommation 950W
Alimentation CA 50 Hz/60 Hz, 110V/120V/220V/240V
Dimensions (L×H×Pr) 430 × 178 × 416 mm
Poids 18.4 kg

Nota:
La Société NATIONAL-PANASONIC-FRANCE, importateur du matériel MATSUSHITA-ELECTRIC déclare que cet appareil est conforme aux prescriptions de la directive 76/889/C.E.E. (arrêté 14 Janvier 1980).

Remarque:
On mesure la distorsion harmonique totale au moyen d'un analyseur de spectre digital (Système H.P. 3045).

Sujet á changement sans prearis.

■ ESPECIFICACIONES

(DIN 45 500)

■ SECCION AMPLIFICADOR

Potencia continua de 20 Hz~20 kHz
en ambos canales 2 × 150W (8Ω)
2 × 150W (4Ω)

Potencia continua de 40 Hz~16 kHz
en ambos canales 2 × 150W (8Ω)
2 × 150W (4Ω)

Potencia continua de 1 kHz
en ambos canales 2 × 150W (8Ω)
2 × 150W (4Ω)

Distorsión armónica total
potencia de régimen a 20 Hz~20 kHz 0,002% (8Ω)
0,002% (4Ω)
potencia de régimen a 40 Hz~16 kHz 0,002% (8Ω)
0,002% (4Ω)
potencia de régimen a 1 kHz 0,002% (8Ω)
0,002% (4Ω)
mitad de potencia a 20 Hz~20 kHz 0,001% (4Ω)
mitad de potencia a 1 kHz 0,0005% (4Ω)
−26 dB de potencia a 1 kHz 0,001% (4Ω)
50 mW de potencia a 1 kHz 0,001% (4Ω)

Distorsión por intermodulación
potencia de régimen a 250 Hz: 8 kHz=4:1, 4Ω 0,002%
potencia de régimen a 60 Hz: 7 kHz=4:1, SMPTE, 8Ω 0,002%

TIM (distorción intermodular transitoria) insignificante

Ancho de banda de potencia
con ambos canales, −3 dB T.H.D. 0,01%
5 Hz~100 kHz (4Ω)

Zumbido residual y ruido 0,13 mV
Factor de amortiguamiento 50 (4Ω), 100 (8Ω)
Sensibilidad e impedancia de entrada 1V/47 kΩ
Relación de señal a ruido 108 dB (121 dB, IHF, A)
Respuesta de frecuencia
DC ~20 kHz, +0 dB, −0,1 dB
DC ~150 kHz, +0 dB, −3 dB
Equilibrio de canales, 250 Hz a 6,300 Hz ±0,5 dB
Separación de canales, 1 kHz 60 dB
Impedancia y nivel de salida de los auriculares 800 mV/330Ω
Impedancia de carga
MAIN o REMOTE 4Ω~16Ω
MAIN y REMOTE 8Ω~16Ω
Medidor
campo de lectura 0,0001 W~300 W (8Ω)
−60 dB~+5 dB
(compresión logarítmica)
respuesta de frecuencia (precisión de lectura)
20 Hz~20 kHz ±2 dB (más de −50 dB)
20 Hz~20 kHz ±3 dB (menos de −50 dB)

■ GENERAL

Consumo de energía 950W
Alimentación de energía
CA 50 Hz/60 Hz, 110V/120V/220V/240V
Dimensiones (An.×Al.×Prof.) 430 × 178 × 416 mm
Peso 18,4 kg

Nota:
La distorsión armónica total se mide con el analizador de espectro digital (sistema H.P. 3045).

Estas especificaciones están sujetas a cualquier cambio sin previo eviso.

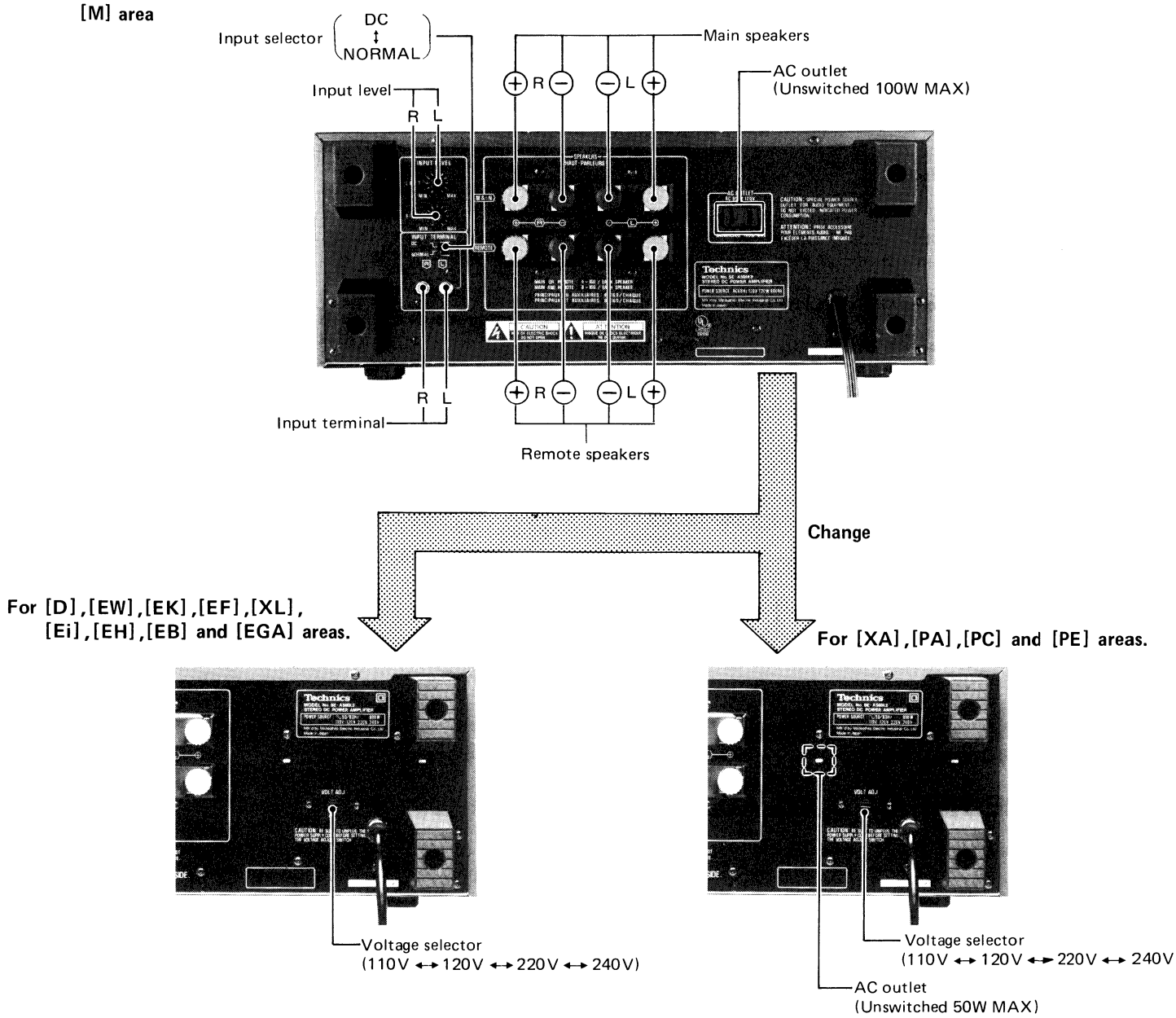
■ BEFORE REPAIR AND ADJUSTMENT

1. Turn off the power supply and short-circuit of power supply capacitors (C401 ~ C404, 8200μF) at resistance (about 10Ω, 5W) in order to discharge the charged voltage. Do not short between C401 ~ C404 by screwdriver. It may damage the component.
2. Before turning on the power supply after completion of repair, slowly apply the primary voltage by using a power supply voltage controller to make sure that the consumed current is free of abnormality. The consumed current at 60Hz/50Hz in no signal mode is shown below with respect to supply voltage 110V/120V/220V/240V.

Power supply voltage		AC110V	AC120V	AC220V	AC240V
Cousumed current	50 Hz	410 ~ 930mA	370 ~ 840mA	210 ~ 460mA	190 ~ 440mA
	60 Hz	−	360 ~ 820mA	−	−

■ LOCATION OF CONTROLS

- **Change of Rear panel**



■ MESSUNGEN UND JUSTIERUNGEN

1. Leerlauf-(ICQ)-Justierung (nach Reparatur des Hauptverstärkers) [Abb. 7]

(1) Nach erfolgter Reparatur ist der Lautstärkeregler auf Maximum einzustellen, bevor der Netzschalter eingeschaltet wird, und an die Lautstrecher-Ausgangsanschlüsse ist nichts anzuschließen.

(2) Die ICQ-regler (VR301, VR302) entgegen dem Uhrzeigersinn drehen.

(3) Die dem Verstärker zugeführte Spannung allmählich von 0V mittels eines Stromversorgungs-Spannungsreglers erhöhen und überprüfen, daß der in der Abbildung auf Seite 4 gezeigte Wert eingehalten wird, bevor mit der Justierung begonnen wird.

(4) Das elektronische Gleichstrom-Voltmeter an TP301 (+) und TP303 (–) (L. Kanal) order TP302 (+) und TP304 (–) (R. Kanal) anschließen.

(5) VR301 (L. Kanal) order VR302 (R. Kanal) so justieren, daß die Spannung ca. 15 Sekunden nach Einschalten des Natzschalters 4mV beträgt.

In diesem Gerät wird ICQ durch einen Mikrocomputer geregelt, und ICQ von etwas mehr als dem normalen Pegel wird durch "PREHEAT" ca. 15 Sekunden lang nach Einschalten der Stromzufuhr angelegt. Danach werden der Ausgangspegel und die Transistortemperatur durch "Auto" erfaßt, wodurch ICQ automatisch geregelt wird.

2. Pegeljustierung des Spitzenleistungsmeters (nach Reparatur der Meterverstärkungs-Schaltung oder Auswechseln des Spitzenleistungsmeters)

(1) Den Eingangspegelregler in die Maximum-Position stellen.
(2) Einen Blindwiderstand von 8 Ohm oder einen Lautsprecher von 8 Ohm Impedanz und ein Wechselstrom-Voltmeter an den Lautsprecheranschluß anschließen.
(3) Ein 1kHz-Sinuswellensignal an den AUX/CD/VIDEO-Anschluß einspeisen und die Eingangsleistung so regeln, daß die Ausgangsleistung am Lautsprecheranschluß 28,3V beträgt.
(4) Beide Kanäle mit VR101 (L. Kanal) und VR102 (R. Kanal) so abgleichen, daß das Meter 100W anzeigt.

3. Prüfen der Stummschaltung während Ein- und Ausschalten der Stromzufuhr

(1) Eine 8 Ohm-Last und das Wechselstrom-Voltmeter an den Lautsprecheranschluß anschließeb.
(2) Den Eingangspegelregler in die Maximum-Position stellen.
(3) Ein Sinuswellensignal von 1kHz, 0,5V an den Lautsprecheranschluß einspeisen.
(4) Überprüfen, ob die Ausgangsleistung ca. 3 ~5 Sekunden nach Einschalten des Netzschalters ausgegeben wird.
(5) Die Ausgangsleistung sollte beim Ausschalten des Netzschalters sofort verschwinden.

4. Prüfen der Gleichstrom-Detektionsschaltung

(1) Den Eingangspegelschalter in die Maximum-Position stellen.
(2) Gleichspannung +1V (an L. Kanal) und −1V (an R. Kanal an den Gleichstrom-Eingangsanschluß anlegen.
(3) Überprüfen, daß
- das Relais ausgeschaltet ist.
- die "auto"-Anzeige erlöscht.
- die "safety operation"-Anzeige blinkt.

5. Prüfen der Überlast-Detektions- und Schutzschaltung

(1) Eine 8 Ohm-Last (Widerstand oder Lautsprecher) und Wechselstrom-Voltmeter an den Hauptlautsprecher-Anschluß anschließen.
(2) Den Hauptlautsprecher-Wahlschalter in die "on"-Position stellen.
(3) Einen 0,33 Ohm-Widerstand (5W) and den Nebenlautsprecher-Anschluß anschließen.
(4) Ausgangssignal von ca. 5V (1kHz) an den Eingangsanschluß eingeben.
(5) Überprüfen, daß keine Ausgangsleistung ausgegeben wird, wenn der Nabenlautsprecher-Schalter auf "on" gestellt wird.

Wenn die Schutzschaltung aktiviert wird, funktioniert das Gerät erst wieder nach Aus- und Wiedereinschalten der Stromzufuhr.

■ MESURAGES ET RÉGLAGES

1. Réglage de la marche à vide (ICQ) (après réparation de l'amplif. principal) [Fig. 7]

(1) Après la réparation, régler le volume sonore au maximum avant de mettre en circuit le commutateur d'alimentation, et ne rien raccorder aux bornes des haut-parleurs.
(2) Tourner complètement la commande ICQ (VR301, VR302) dans le sens inverse des aiguilles d'une montre.
(3) Augmenter peu à peu la tension appliquée à l'amplificateur à partir de 0V au moyen d'un contrôleur de tension d'alimentation en courant et s'assurer de la valeur indiquée à la Figure de la page 4 avant de commencer le réglage.
(4) Raccorder le voltmètre électronique à C.C. à TP301 (+) et à TP303 (−) (Canal de gauche) ou à TP302 (+) et à TP304 (−) (Canal de droite).
(5) Ajuster VR301 (Canal de gauche) ou VR302 (Canal de droite) de telle sorte que la tension soit de 4mV à peu près 15 secondes après avoir mis en circuit ("on") le commutateur d'alimentation.

Dans cet appareil, ICQ est contrôlé par un micro-ordinateur, et ICQ légèrement plus élevé que le niveau normal est appliqué par "PRECHAUFFAGE" pendant à peu près 15 secondes après la mise sous tension. Après cela, le niveau de sortie et la température du transistor sont détectés par "AUTO", contrôlant automatiquement de ce fait ICQ.

2. Réglage du niveau du mesureur de puissance de crête (après la réparation du circuit de l'amplificateur du mesureur ou le remplacement du mesureur de puissance de crête).

(1) Régler l'ajustement du niveau d'entrée sur la position maximale.
(2) Raccorder une résistance fictive de 8Ω ou un haut-parleur d'une impédance de 8Ω et un voltmètre à C.A. à la borne du haut-parleur.
(3) Appliquer une onde sinusoïdale de 1kHz à la borne AUX/CD/VIDEO et régler l'entrée de telle sorte que la puissance de sortie à la borne du haut-parleur soit de 28,3V.
(4) Ajuster à la fois les canaux de VR101 (Canal de gauche) et de VR102 (Canal de droite) de telle sorte que l'indication du mesureur soit de 100W.

3. Vérification du circuit d'accord silencieux pendant le fonctionnement de la "mise en circuit" — "hors circuit" de l'énergie.

(1) Raccorder une charge de 8Ω et un voltmètre à C.A. à la borne du haut-parleur.
(2) Régler l'ajustement du niveau d'entrée à la position maximale.
(3) Appliquer une onde sinusoïdale de 1kHz de 0,5V à la borne du haut-parleur.
(4) S'assurer que la puissance de sortie soit délivrée à peu près 3 ~ 5 secondes après la mise en circuit ("on") de l'interrupteur d'alimentation.
(5) La puissance de sortie devra immédiatement se modifier lorsque l'interrupteur d'alimentation est tourné sur la "mise hors circuit ("off").

4. Vérification du circuit de détection à C.C.

(1) Régler l'ajustement du niveau d'entrée sur la position maximale.
(2) Appliquer une tension C.C. de +1V (au canal gauche) et de −1V (au canal droit) à la borne d'entrée à C.C.
(3) S'assurer que
- le relais soit hors circuit.
- la "mise en circuit" de l'indicateur "auto" s'éteigne.
- l'indicateur du "fonctionnement de sécurité" clignote.

5. Vérification de la détection de surcharge et du circuit de protection.

(1) Raccorder 8Ω (résistance ou haut-parleur) et un voltmètre à C.C. à la borne du haut-parleur principal.
(2) Le sélecteur du haut-parleur principal est sur la position de "mise en circuit" ("on").
(3) Raccorder une résistance de 0,33Ω (5W) à la borne du hautparleur auxiliaire.
(4) Appliquer un signal de sortie d'environ 5V à 1kHz à la borne d'entrée.
(5) S'assurer qu'aucune puissance de sortie ne soit délivrée lorsque le commutateur du haut-parleur auxiliaire est réglé sur "on" (mise en circuit).

Lorsque l'ensemble des circuits de protection fonctionne, l'appareil ne se mettra pas en marche à moins que l'énergie ne soit d'abord mise hors circuit puis remise à nouveau en circuit.

■ MEDICIONES Y AJUSTE

1. Ajuste de marcha en vacío (ICQ) (Después de reparar el amplificador principal.) [Fig. 7]

(1) Después de la reparación, ponga el volumen de sonido en máximo antes de conectar el interruptor de corriente, y no conecte nada a los terminales de altavoz.
(2) Gire completamente el control ICQ (VR301, VR302) a la izquierda.
(3) Aumente el voltaje aplicado al amplificador gradualmente dese 0V por medio del controlador de voltaje de suministro de energía, y asegúrese del valor en la Figura de la página 4 antes de comenzar el ajuste.
(4) Conecte el voltímetro electrónico de CC a TP301 (+) y TP303 (−) (Ch. I) o TP302 (+) y TP304 (−) (Ch. D).
(5) Ajuste VR301 (Ch. I) o VR302 (Ch. D) de manera que el voltaje sea 4mV unos 15 seg. después de poner en "on" (conectado) el interruptor de alimentación.

En este aparato, ICQ es controlado mediante microcomputador, y ICQ, un poco más del nivel normal, es aplicado "PRECALENTAMIENTO" por unos 15 seg. después de conectar. Después de eso, el nivel de salida y temperatura de transistor son detectados mediante "AUTO", por lo cual controlando automáticamente ICQ.

2. Ajuste de nivel de medidor de potencia de cresta (después de reparar el circuito de amp. de medidor o reemplazar el medidor de potencia de cresta.)

(1) Ponga el ajuste de nivel de entrada en la posición máxima.
(2) Conecte un resistor ficticio de 8Ω o un altavoz de impedancia de 8Ω y voltímetro CA al terminal de altavoz.
(3) Aplique onda sinusoidal al terminal AUX/CC/VIDEO y ajuste la entrada de manera que la salida a la terminal de altavoz sea 28,3V.
(4) Ajuste ambos canales de VR101 (Ch. I) y VR102 (Ch. D) de manera que la indicación del medidor sea 100W.

3. Comprobación de circuito silenciador durante operación de "conexión" — "desconexión" de corriente.

(1) Conecte una carga de 8Ω y un voltímetro de CA al terminal de altavoz.
(2) Ponga el ajuste de nivel de entrada en la posición máxima.
(3) Aplique onda sinusoidal de 1kHz, 0,5V al terminal de altavos.
(4) Asegúrese de que la salida es suministrada unos 3 ~ 5 seg. después de poner en "on" (conectado) el interruptor de alimentación.
(5) Salida debe desparecer inmediatamente cuando se pone en "off" (desconectado) el interruptor de alimentación.

4. Comprobación de circuito de detección de CC

(1) Ponga el ajuste de nivel de entrada en la posición máxima.
(2) Aplique voltaje CC + 1V (a Ch. I), −1V (a Ch. D) al terminal de entrada de CC.
(3) Asegúrese de que
- el relé está en "off".
- indicador "auto" "on" se apaga.
- ilndicador de "operación segura" parpadea.

5. Comprobación de detección de sobrecarga y circuito de protección

(1) Conecte 8Ω (resistor o altavoz) y voltímetro CA al terminal de altavoz principal.
(2) Selector de altavoz principal está en posición "on".
(3) Conecte resistor de 0,33Ω (5W) al terminal de altavoz remoto.
(4) Aplique señal de salida de unos 5V a 1kHz a terminal de entrada.
(5) Asegúrese de que no se suministra salida cuando el interruptor de altavoz remote es peusto en "on".

Cuando la circuitería de protección funciona, la unidad no operará a no ser que primero se desonecte la corriente y luego se conecte de nuevo.

CHANGE

■ CHANGE OF THE REPLACEMENT PARTS LIST

Notes: 1. part numbers are indicated on most mechanical parts. Please use this part number for parts orders.
2. Important safety notice: Components identified by ⚠ mark have special characteristics important for safety. When replacing any of these components use only manufacturer's specified parts.
3. The " Ⓢ " mark is service standard parts and differ from production parts.

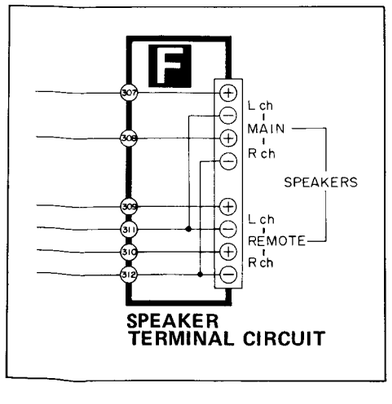
Ref. No.	Change of Part No. SE-A5MK2 [M]	Change of Part No. SE-A5MK2 [D,EW,EK,EF,XA,PE,PA,XL,Ei,EH,EB,PC,EGA]	Pcs.	Part Name & Description
COILS				
L1, 2	Addition	ELQ050D15		Choke [EGA] only
L901~904	Addition	SLQY07G-30		Choke [EGA] only
TRANSFORMERS				
T502 ⚠	SLT5S68	SLT5S69		Power Source
T501 ⚠	SLT5L178	SLT5L178-1		Meter
FUSES				
F1 ⚠	XBA1F80NU14	XBA2C40TR0		250V, T4A
F2 ⚠	XBA2F03NU100	XBA2C40TR0		250V, T4A
F3 ⚠	Addition	XBA2C03TR0		250V, T315mA
SWITCHES				
S501 ⚠	ESB9939T	ESB90227S		Power Source [EGA] only
		ESB99399S		Power Source [Other areas]
S601 ⚠	Addition	ESE37200		Voltage Selection
CAPACITORS				
C3, 4 ⚠	Addition	ECKDKC222MF2		0.0022μF, [EGA] only
C5, 6 ⚠	Addition	ECKDKC222MF2		0.0022μF, [EGA] only
C7 ⚠	Addition	ECQE2A473MW		0.047μF, [EGA] only
C8 ⚠	Addition	ECQE2104KZ		0.1μF, [D, EF, EGA, Ei EH, EB] only
C901~904	Addition	ECKD1H681KB		680pF, [EGA] only
C905~908	Addition	ECQM1H103KV		0.01μF, [EGA] only
C1001 ⚠	Addition	ECKDKC103PF2		0.01μF
C1002 ⚠	Addition	ECKDKC103PF2		0.01μF, [EGA] only
RESISTORS				
R401~404 ⚠	ERD2FG5R6	ERD25FJ2R2		2.2Ω
R407, 408 ⚠	Addition	ERD25FJ2R2		2.2Ω
CABINET and CHASSIS PARTS				
25	SJT345	SJT347	(6)	Holder, Fuse
40 ⚠	SHR129	SHR129	(1)	Bushing, AC Cord, [EK] only
		SHR127	(1)	Bushing, AC Cord, [EW, XA, PA, PE, PC] only
		SHR131	(1)	Bushing, AC Cord, [Other areas]
41 ⚠	SJA129-1	SWY117	(1)	AC Cord, [WE] only
		SJA121	(1)	AC Cord, [XA,PA,PE,PC] only
		QFC1205M	(1)	AC Cord, [EK] only
		QFC1207MA	(1)	AC Cord, [XL] only
		SWY143	(1)	AC Cord, [Other areas]
42 ⚠	SJS9221	SJS9221	(1)	Socket, [XA,PA,PE,PC] only
43	SGP2391C	SGP2391-2A	(1)	Rear Panel, [EW]
		SGP2391-3A	(1)	Rear Panel, [XA,PA,PE,PC]
		SGPEA5MK2-KK	(1)	Rear Panel, [EK]
		SGPEA5MK2-KE	(1)	Rear Panel, [D]
		SGP2391-1A	(1)	Rear Panel, [Other areas]
49	Addition	SMN1685-3	(1)	Bracket, P.C.B.
SCREWS				
N12	Addition	XTBS3+8BFZ1	(1)	Tapping, ⊕ 3 x 8 [EGA] only
		XTW3+8H	(1)	Tapping, ⊕ 3 x 8 [Other areas]
N13	Addition	XTW3+8H	(1)	Tapping, ⊕ 3 x 8
N14	Addition	XTBS3+8BFZ1	(2)	Tapping, ⊕ 3 x 8
N30	Addition	XSN3+6BVS	(2)	⊕ 3 x 6
WASHER				
M31	Addition	XWA3BFZ	(2)	Spring, φ3
ACCESSORIES				
A2	SQF12032	SQF12035	(1)	Instruction Book, [XA,PC]
		SQF12036	(1)	Instruction Book, [PA,PE]
		SQF12037	(1)	Instruction Book, [EGA]
		SQF12034	(1)	Instruction Book, [Other areas]
A3 ⚠	Addition	SJP9215	(1)	Plug, [XA,PA,PE,PC] only
PACKING PARTS				
P5	SPG4787	SPG4835	(1)	Carton Box, [EK]
		SPG4790	(1)	Carton Box, [EF]
		SPG4787	(1)	Carton Box, [EW,XA,PA,PE,PC]
		SPG4789	(1)	Carton Box, [Other areas]
P6	Addition	SPS4413	(1)	Pad, [D,EGA,EF,Ei,EH, EB,XL]

■ SCHEMATIC DIAGRAM

Additional parts

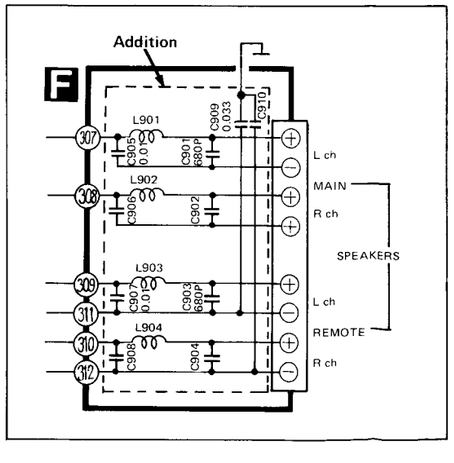
• Change of Speaker Terminal Circuit

[M] area



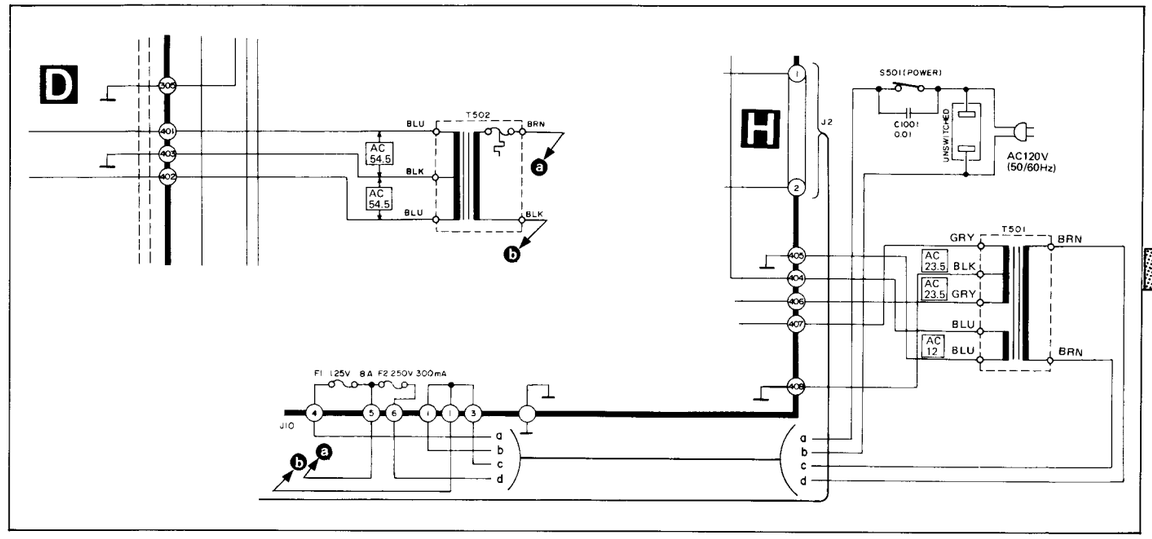
Change

For [EGA] area

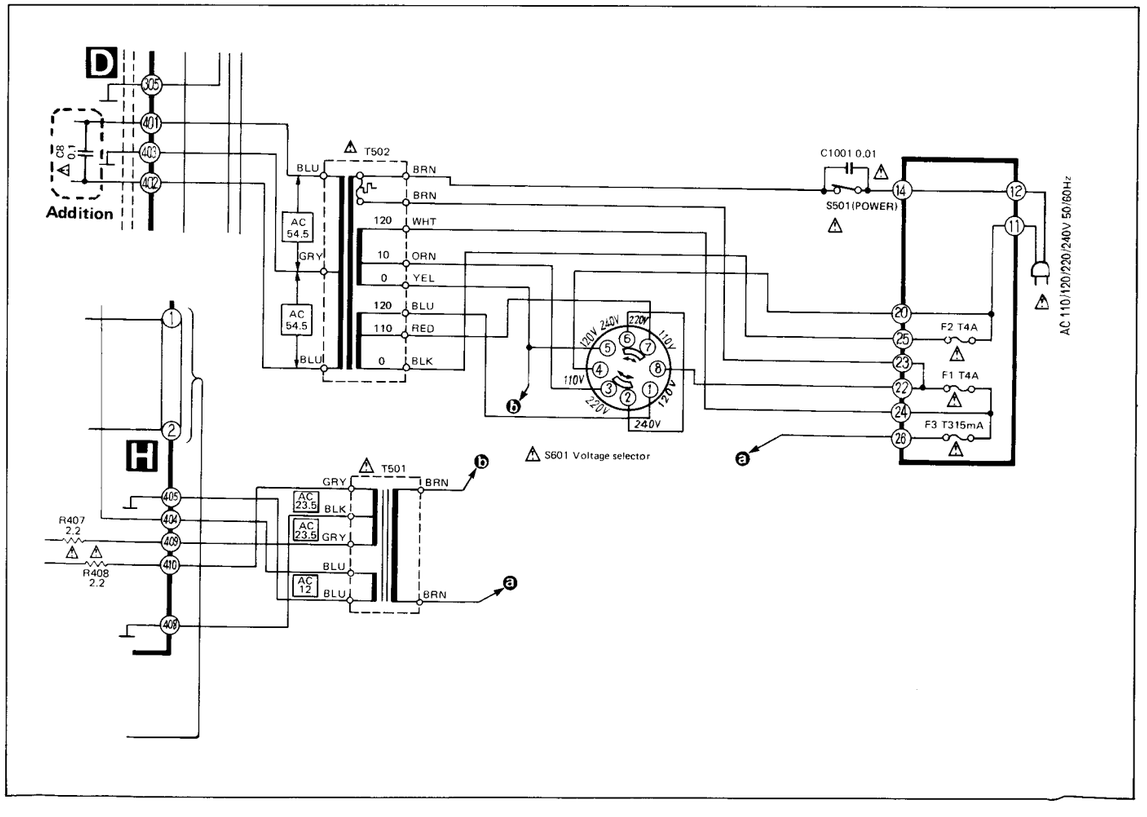


• Change of Power Supply

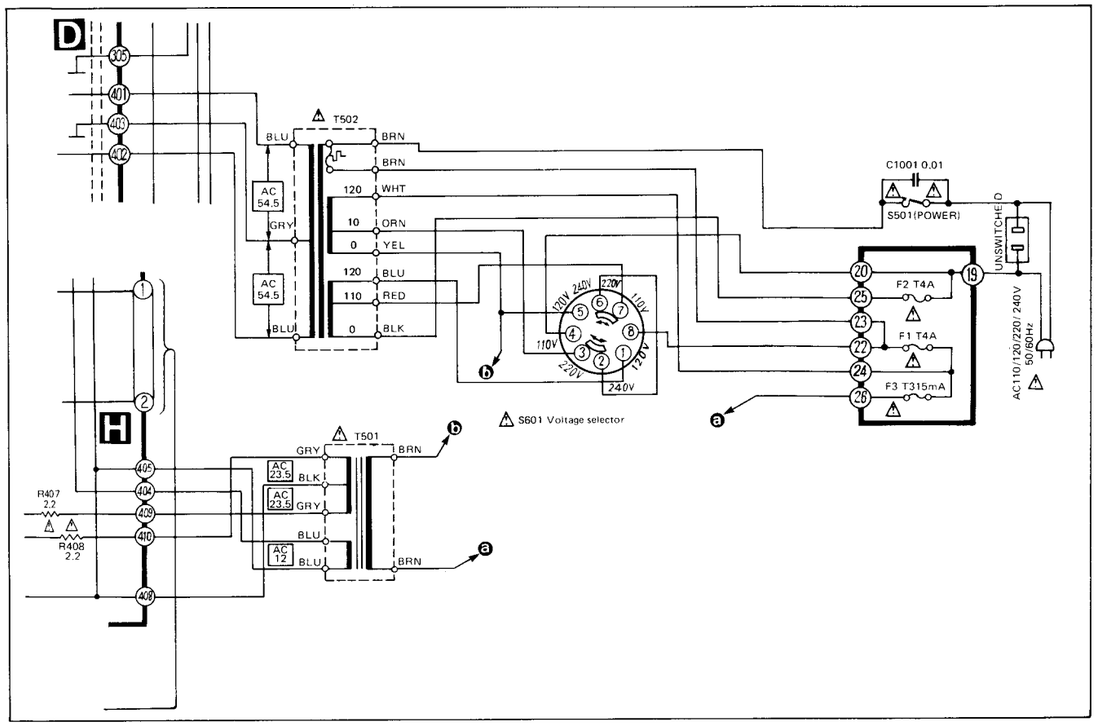
[M] area



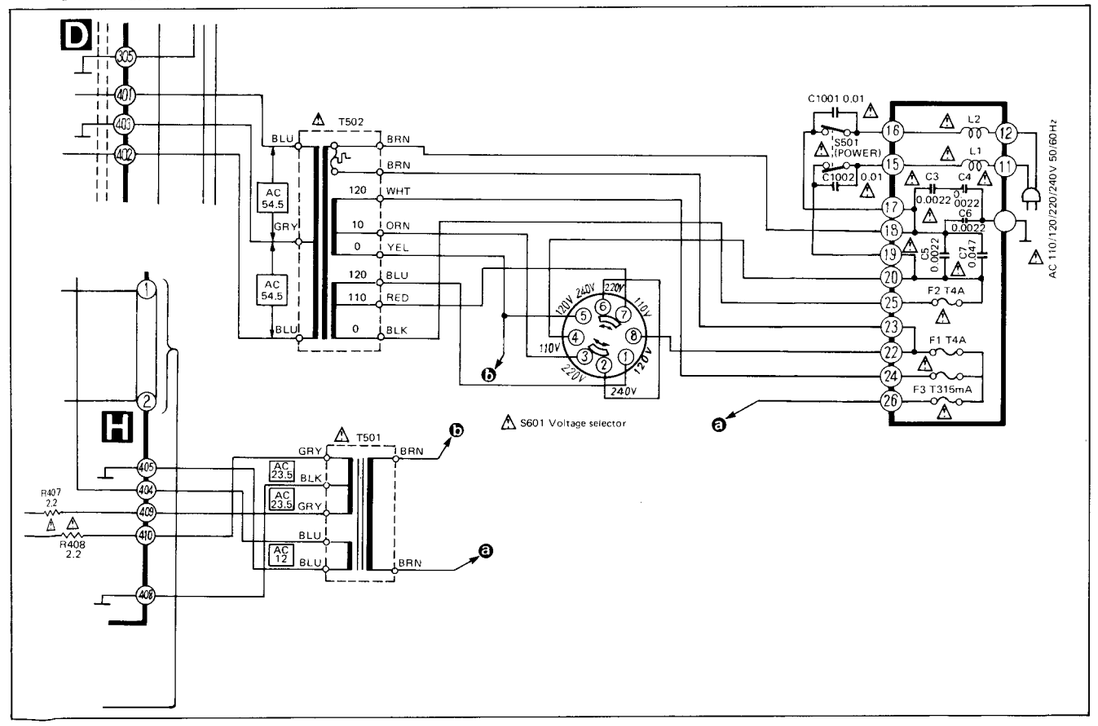
For [D],[EW],[EK],[EF],[XL],[Ei],[EH] and [EB] areas



For [XA],[PC],[PA] and [PE] areas



For [EGA] area

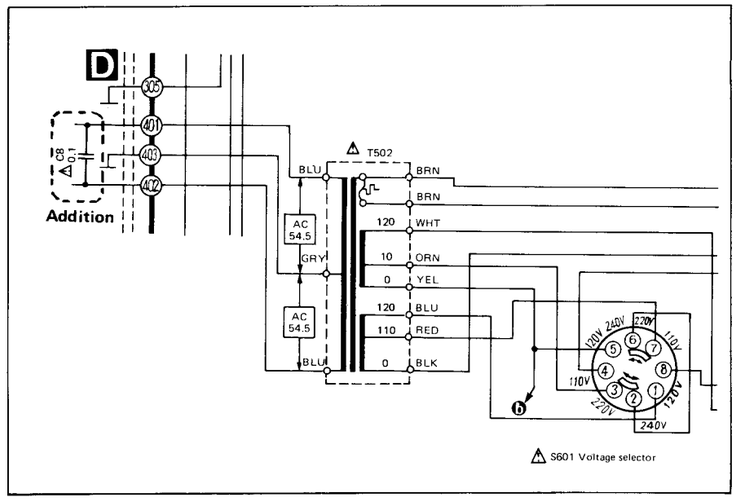


Important safety notice:

Components identified by ⚠ mark have special characteristics important for safety.
When replacing any of these components, use only manufacturer's specified parts.

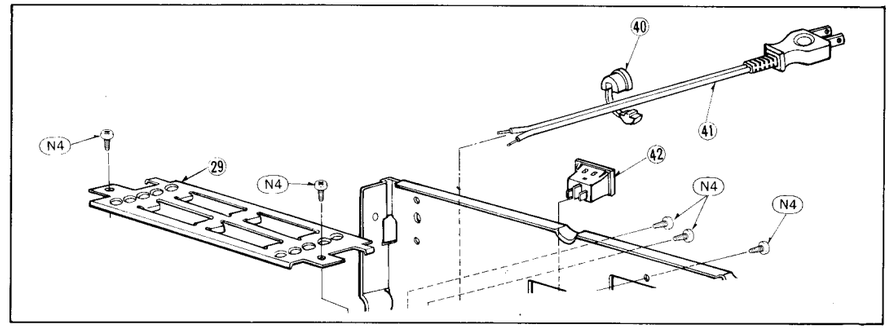
• Change of Meter Power Source

For [D],[EW],[EK],[EF],[XL],[Ei],[EH] and [EB] areas

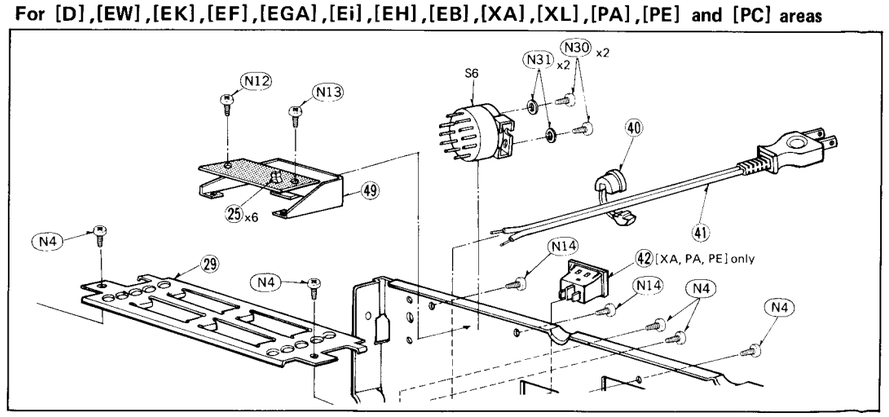


• Change of Exploded View

[M] area



For [D],[EW],[EK],[EF],[EGA],[Ei],[EH],[EB],[XA],[XL],[PA],[PE] and [PC] areas



■ REPLACEMENT PARTS LIST

Notes:

1. Part numbers are indicated on most mechanical parts. Please use this part number for parts orders.
2. Important safety notice: Components identified by ⚠ mark have special characteristics important for safety. When replacing any of these components use only manufacturer's specified parts.
3. Bracketed indications in Ref. No. columns specify the area. Parts without these indicators can be used for all areas.
4. The " Ⓢ " mark is service standard parts and may differ from production parts.
5. The parenthesized numbers in the column of description stand for the quantity per set.

Areas

* [D] is available in Scandinavia.
* [EW] is available in Switzerland.
* [EK] is available in United Kingdom.
* [EF] is available in France.
* [XA] is available in Southeast Asia, Oceania, Africa, Middle Near East and Central South America.
* [PE] is available in European Military.
* [PA] is available in Far East PX.
* [XL] is available in Australia.
* [Ei] is available in Italy.
* [EH] is available in Holland.
* [EB] is available in Belgium.
* [PC] is available in European Audio Club.
* [EGA] is available in Germany.

Ref. No.	Part No.	Part Name & Description
INTEGRATED CIRCUITS		
IC21	MN1404STE	ICQ Controller
IC101,102	SVITA7318P	Meter Drive
IC301	AN6552F	DC Servo
TRANSISTORS		
Q21～29,101 102,313,314 337,338,401 503,505,601 703,704	2SC1815－Y	Signal Detector, DC Detector, Indicator Drive, Regulator, Muting, Current Stabilizer, Bias Control, ICQ Control, Switching
Q301～304	2SK117－GR	FET Differential Amp.
Q305～308	2SC1815－G	Cascade
Q309～312	2SC1845－E	Differential Amp.
Q315～318,323 324	2SA1370－D	Current Mirror, Pre Drive, Drive
Q319～322	2SC3467－D	Pre Drive, Drive
Q325,326	2SC3298A－Y	Class A Drive
Q327,328	2SA1306A－Y	Class A Drive
Q329～332	2SC3280－R	Power Amp.
Q333～336	2SA1301－R	Power Amp.
Q402,602	2SA1015－Y	Regulator, Relay Dive
Q501,502	2SC1845－E	Over load Detector
Q504	2SD1265－O	Regulator
Q701,702	2SC3467－D	Current Detector
Q705,706	2SA1370－D	Switching
Q707,708	2SC2632－R	Switching
Q709,710	2SA1124－R	Voltage Control
DIODES		
D21,22 Ⓢ 301～306 501～506 601～603 711～714	MA162A	Switching
D23	MA1062M	Zener, 6.2V
D307～310 701～704	MA182	Switching
D311～318	OA90A－R	
N319～322	MA27W－A	
D401,402 ⚠	SVDS10VB20F	Rectifier
D405～412 Ⓢ⚠	SVDSR1K2	Rectifier
D413,414	SVDMZ316A	Zener, 16V
D507	SVDMZ318	Zener, 18V
D705～708	SVDMZ316B	Zener, 16V
D709,710	MA27B	
D715,716	SVDMZ322A	Zener, 22V
COILS		
L1,2[EGA]only	ELQ050D15	Choke
L301,302	SLQY15G－30	Choke
L901～904[EGA] only	SLQY07G－30	Choke
TRANSFORMERS		
T502 ⚠	SLT5S69	Power Source
T501 ⚠	SLT5L178－1	Meter
VARIABLE RESISTORS		
VR101,102	EVNK6AA00B32	Power Meter Adj., 300Ω(B)
VR201,202	EVH6UA524B54	Input Level, 50kΩ (B)
VR301,302	EVNK6AA00B13	ICQ Adj., 1kΩ(B)
THERMISTERS		
TH301,302	ERTD2ZHL333S	33kΩ

Ref. No.	Part No.	Part Name & Description
COMPONENT CONBINATIONS		
Z401～403 ⚠	SXRFS203ZSM	0.01μF(×2)
THERMAL DETECTOR		
PS501	SRPBG47101	60°C(140°F)
RELAY		
RLY601,602 ⚠	SSY124	Speaker
RLY603 ⚠	SSY9	Meter
LAMP		
PL1～18	XAMR74S17	Meter (12V,0.055 A)
PL19～21	XAMR48S230	Computer Drive, Sefety Operation, Power(12V,0.04A)
PL22～24	XAMR48T250	Speaker Ind. (12 V,0.04A)
METER		
	SSM161－1	Peak Power Meter
FUSES		
F1,2 ⚠	XBA2C40TRO	250V, T4A
F3 ⚠	XBA2C03TRO	250V, T315mA
SWITCHES		
S1	SSS49	Input Selector
S2	SSH475	Speaker
S501[EGA]only ⚠	ESB90227S	Power Source
S501[other areas] ⚠	ESB99399S	Power Source
S601 ⚠	ESE37200	Voltage Selec tor
CABINET PARTS and CHASSIS PARTS		
1	SBC645－1A	Button,(off) (1)
2	SBC645－1B	Button,(main) (1)
3	SBC645－1C	Button,(remote) (1)
4	SBC645－1D	Button,(main and remote) (1)
5	SUS191－2	Spring, Button (4)
6	SGWEA5MK2－KM	Front Panel, Ass'y (1)
7	SHG6349	Rubber (4)
8	SGE693－1	Bracket, Left (1)
9	SGE693	Bracket, Right (1)
10	SGE697	Reflector Plate (1)
11	SGEEA5MK2－KN	Ornament (1)
12	SDE259－1	Filter, Lamp (1)
13	SMP305	Case, Lamp (1)
14	SUW2155	Bracket, Lamp Case (1)
15	SHG1575	Rubber, Lamp (6)
16	SHP9379	Sheet, Lamp (2)
17	SMP293	Bracket, Lamp (1)
18	SMK61	Bracket, Headphone (1)
19	SJJ71B	Jack, Headphone (1)
20	SUW1955	Bracket, Meter (1)
21	SBC627	Button, Power Source (1)
22	SDU35－1	Filter, Meter (1)
23	SHS6129	Sheet (2)
24	SMP371	Reflector Plate (1)
25	SJT347	Holder, Fuse (6)
26	SKCEA5MK2－KM	Cabinet (1)

Ref. No.	Part No.	Part Name & Description
27	SML101－1	Bracket, Power Transformer (1)
28	SUW2153－3	Bracket (1)
29	SMN1895－1	Braket (1)
30	SUW1595	Bracket (1)
31	SUW1701	Bracket (1)
32	SUW1593	Bracket (1)
33	SUW2153－2	Bracket (1)
34	SKU8210－3	Bottom Board (1)
35	SKL247－2	Foot,Bottom Side (4)
36	SJF3225－2A	Terminal Board (1)
37	SMN1729－1	Bracket, Input Level Volume (1)
38	SJT231	Terminal (1)
39	SJF4817	Terminal Board, Speaker (1)
40[EK]	SHR129	Bushing, AC Cord (1)
40[EW,XA, PA,PE,PC]	SHR127	Bushing, AC Cord (1)
40 other areas	SHR131	Bushing, AC Cord (1)
41[EW] ⚠	SWY117	AC Cord (1)
41[XA,PA,PE, PC] ⚠	SJA121	AC Cord (1)
41[EK] ⚠	QFC1205M	AC Cord (1)
41[XL] ⚠	QFC1207MA	AC Cord (1)
41 other areas ⚠	SWY143	AC Cord (1)
42[XA,PA,PE, PC]only ⚠	SJS9221	Socket, AC Outlet (1)
43[EW]	SGP2391－2A	Rear Parel (1)
43[XA,PA,PE, PC]only	SGP2391－3A	Rear Panel (1)
43[EK]	SGPEA5MK2－KK	Rear Panel (1)
43[D]	SGPEA5MK2－KE	Rear Panel (1)
43 other areas	SGP2391－1A	Rear Panel (1)
44	SBN613	Knob, Input Level Volume (2)
45	SKL241	Foot, Rear Side (4)
46	SHG1509	RUbber, Button (4)
47	SHS2445	Sheet (2)
48	SHS2437	Sheet (1)
49	SMN1685－3	Bracket, P. C. B. (1)
SCREWS		
N1 Ⓢ	XTB3＋8BFZ	Tapping, ⊕3×8 (30)
N2 Ⓢ	XTS3＋8BFZ	Tapping, ⊕3×8 (4)
N3 Ⓢ	XSN3＋6S	⊕3×6 (4)
N4	XTBS3＋8BFZ1	Tapping with Detent, ⊕3×8 (42)
N5 Ⓢ	XTN3＋8B	Tapping, ⊕3×8 (12)
N6	XSSS5＋12FIS	⊕5×12 (8)
N7 Ⓢ	XTB4＋10BFN	Tapping, ⊕4×10 (2)
N8	XTB4＋8F	Tapping, ⊕4×8 (8)
N9	XTW3＋12J	Tapping, ⊕3×12 (8)
N10	XTB3＋10FFZ	Tapping, ⊕3×10 (4)
N11	XTB4＋12FFZ	Tapping, ⊕4×12 (4)
N12[EGA]only	XTBS3＋8BFZ1	Tapping with Detent, ⊕3×8 (1)
N12 other areas	XTW3＋8H	Tapping, ⊕3×8 (1)
N13	XTW3＋8H	Tapping, ⊕3×8 (1)

Ref. No.	Part No.	Part Name & Description
N14	XTBS3＋8BFZ1	Tapping with Detent, ⊕3×8 (2)
N30	XSN3＋6BVS	⊕3×6 (2)
WASHERS		
N15 Ⓢ	XWA3B	Spring, φ3 (5)
N16 Ⓢ	XWG3	Plain, φ3 (12)
N17	SNE59－1	(1)
N18 Ⓢ	XWC3B	External Toothed Lock, φ3 (1)
N31 Ⓢ	XWA3BFZ	Spring φ3 (2)
NUTS		
N20 Ⓢ	XNS12	φ12 (1)
N21 Ⓢ	XNG3ES	φ3 (1)
N22	SNE4021	(2)
ACCESSORIES		
A1	SJP2239	Cord, Connection (1)
A2[XA,PC]	SQF12035	Instruction Book (1)
A2[PA,PE]	SQF12036	Instruction Book (1)
A2[EGA]	SQF12037	Instruction Book (1)
A2 other areas	SQF12034	Instruction Book (1)
A3[XA,PA, PE,PC]only ⚠	SJP9215	Plug, AC (1)
PACKING PARTS		
P1	SPP653	Polyethylene Bag (1)
P2	SPH211	Sheet (1)
P3	SPS4303－1	Pad, Bottom (1)
P4	SPS4305－2	Pad, Upper (1)
P5[EK]	SPG4835	Carton Box (1)
P5[EF]	SPG4790	Carton Box (1)
P5[EW,XA, PA,PE,PC]	SPG4787	Carton Box (1)
P5 other areas	SPG4789	Carton Box (1)
P6 [D,EGA,EF, Ei,EH,EB, XL]only	SPS4413	Pad, Rear (1)

Printed in Japan
8406016(0) Ⓚ SH/TN

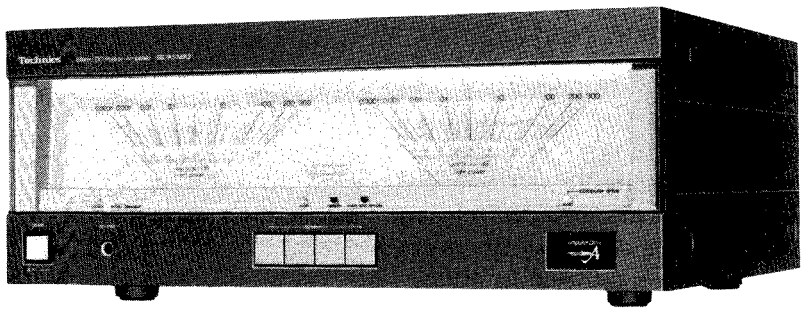
ORDER NO. HAD84032731C1

Service Manual

Stereo DC Power Amplifier

SE-A5MK2

[M], [MC]



Areas

* [M] is available in the U.S.A.
* [MC] is available in Canada.

Specifications

Specifications are subject to change without notice for further improvement.
Weights and dimensions shown are approximate.

(IHF '78)

■ AMPLIFIER SECTION

Rated minimum sine wave RMS power output
20 Hz~20 kHz both channels driven
0.002% total harmonic distortion
150W per channel (8 ohms)
20 Hz~20 kHz both channels driven
0.002% total harmonic distortion
150W per channel (4 ohms)

1 kHz continuous power output
both channels driven
0.002% total harmonic distortion
150W per channel (8 ohms)
0.002% total harmonic distortion
150W per channel (4 ohms)

Dynamic headroom	1.5 dB (8 ohms) 3.6 dB (4 ohms)
Total harmonic distortion	
rated power at 20 Hz~20 kHz	0.002% (8/4 ohms)
half power at 20 Hz~20 kHz	0.001% (8 ohms)
half power at 1 kHz	0.0005% (8 ohms)
Power bandwidth	
both channels driven, −3 dB T.H.D. 0.01%	5 Hz~100 kHz (8 ohms)
Transient intermodulation distortion	unmeasurably small
SMPTE intermodulation distortion	0.002% (8 ohms)
Frequency response	DC~20 kHz (+0 dB, −0.1 dB) DC~150 kHz (+0 dB, −3 dB)
Input sensitivity	90 mV (1V, IHF '66)
S/N (IHF, A)	102 dB (121 dB, IHF '66)
Residual hum and noise	0.13 mV
Input impedance	47 kilohms
Low frequency damping factor	100 (8 ohms) 50 (4 ohms)
Load impedance	
MAIN or REMOTE	4~16 ohms
MAIN and REMOTE	8~16 ohms
Meter	
reading range	0.0001W~300W −60 dB ~+5 dB (logarithmic compression)
frequency response (reading accuracy)	20 Hz~20 kHz ±2 dB (more than −50 dB) 20 Hz~20 kHz ±3 dB (less than −50 dB)

■ GENERAL

Power consumption	720W, 900 VA
Power supply	AC 120V, 60 Hz
Dimensions (W×H×D)	430 × 178 × 416 mm (16-15/16" × 7" × 16-3/8")
Weight	18.4 kg (40.61 lb.)

Note:
Total harmonic distortion is measured by the digital spectrum analyzer (H.P. 3045 system).

Technics

Matsushita Engineering and Service Company
50 Meadowland Parkway,
Secaucus. New Jersey 07094

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91-238 Kauhi St. Ewa Beach
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Ontario, L4W 2T3

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Victoria Industrial Park
Carolina, Puerto Rico 00630

SE-A5MK2

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EXPLODED VIEWS	24 ~ 26

■ FEATURE

- Power as high as 150W + 150W (8Ω/4Ω, 20Hz ~ 20kHz) suitable for the digital audio age.
- Technics original circuit — new class A system that has eliminated both switching and crossover distortions.
- Computer drive circuit that has eliminated transient crossover distortion in playback of music.
- Linear feedback circuit that has completely eliminated theoretical value distortion.
- Power linear circuit that does not allow distortion caused by change in speaker impedance.
- Dual-line speaker terminals that allow the comparison of sounds by one-push operation.
- Dual-line input terminals DC-Normal.

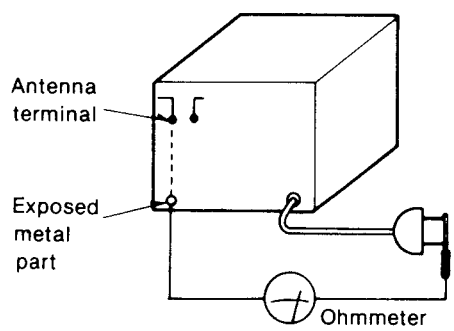
■ SAFETY PRECAUTION

1. Before servicing, unplug the power cord to prevent an electric shock.
2. When replacing parts, use only manufacturer's recommended components for safety.
3. Check the condition of the power cord. Replace if wear or damage is evident.
4. After servicing, be sure to restore the lead dress, insulation barriers, insulation papers, shields, etc.
5. Before returning the serviced equipment to the customer, be sure to make the following insulation resistance test to prevent the customer from being exposed to a shock hazard.

• INSULATION RESISTANCE TEST

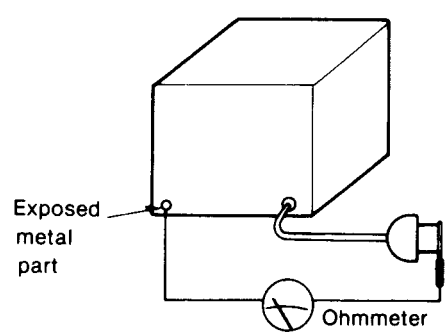
1. Unplug the power cord and short the two prongs of the plug with a jumper wire.
2. Turn on the power switch.
3. Measure the resistance value with ohmmeter between the jumpered AC plug and each exposed metal cabinet part, such as screwheads antenna, control shafts, handle brackets, etc. Equipment with antenna terminals should read between 3MΩ and 5.2MΩ to all exposed parts. (Fig. A) Equipment without antenna terminals should read approximately infinity to all exposed parts. (Fig. B)

Note: Some exposed parts may be isolated from the chassis by design. These will read infinity.



(Fig. A)

Resistance = 3MΩ—5.2MΩ



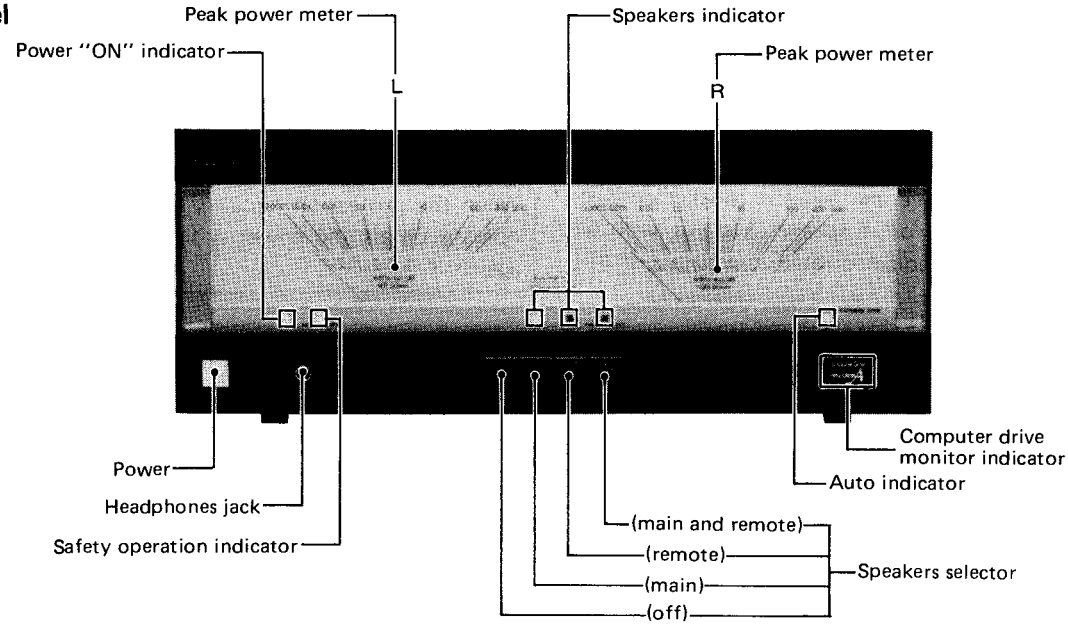
(Fig. B)

Resistance = Approx ∞

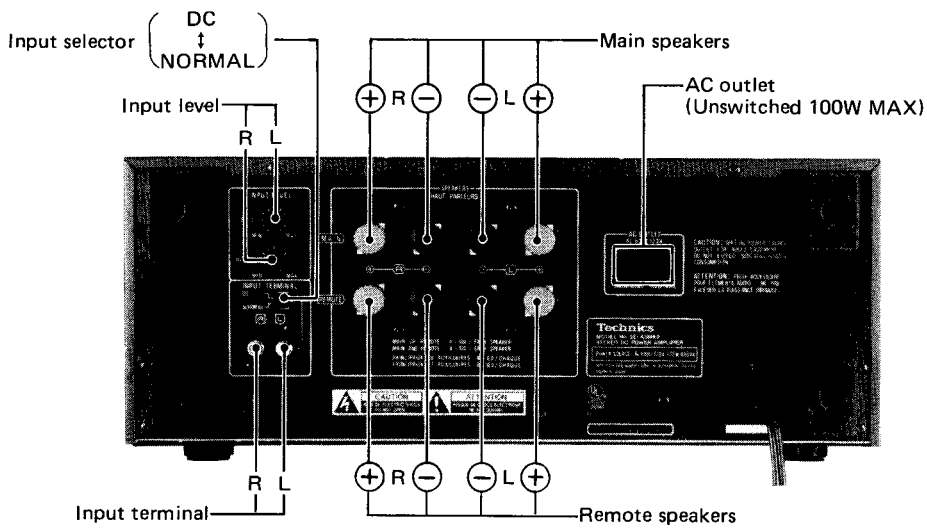
4. If the measurement is outside the specified limits, there is a possibility of a shock hazard. The equipment should be repaired and rechecked before it is returned to the customer.

■ LOCATION OF CONTROLS

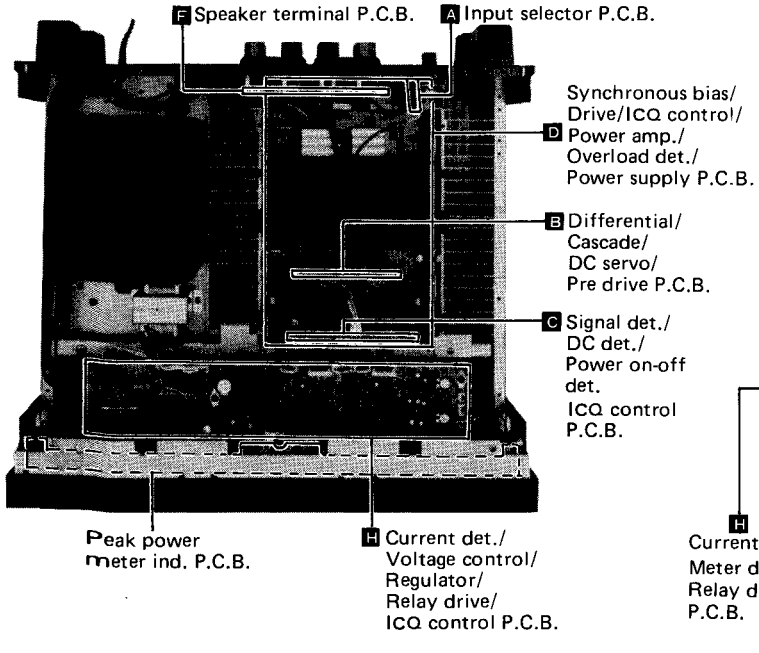
• Front panel



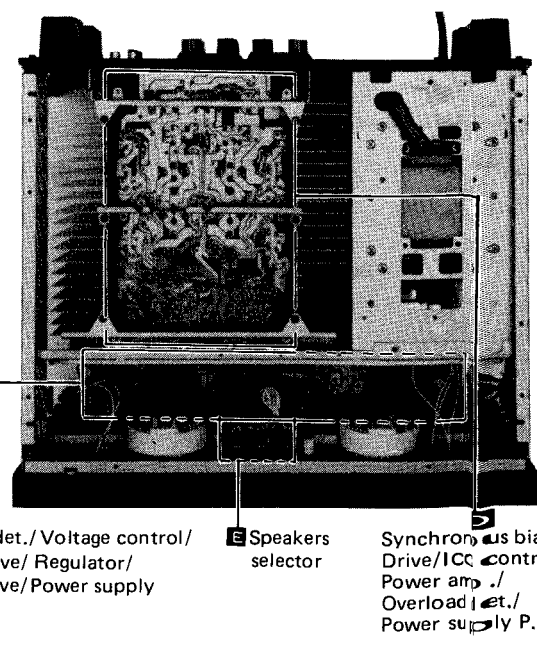
• Rear panel



• Top view


F Speaker terminal P.C.B.
A Input selector P.C.B.
D Synchronous bias/ Drive/ICQ control/ Power amp./ Overload det./ Power supply P.C.B.
B Differential/ Cascade/ DC servo/ Pre drive P.C.B.
C Signal det./ DC det./ Power on-off det. ICQ control P.C.B.
Peak power meter ind. P.C.B.
H Current det./ Voltage control/ Regulator/ Relay drive/ ICQ control P.C.B.

• Bottom view


H Current det./ Voltage control/ Meter drive/ Regulator/ Relay drive/ Power supply P.C.B.
E Speakers selector
D Synchronous bias/ Drive/ICQ control/ Power amp./ Overload det./ Power supply P.C.B.

• Phono input capacitance is about 150pF.

■ PROTECTION CIRCUITRY

The protection circuitry may have operated if either of the following conditions is noticed:

- No sound is heard when the power is turned on.
- Sound stops during a performance.

The function of this circuitry is to prevent circuitry damage if, for example, the positive and negative speaker connection wires are "shorted", or if speaker systems with an impedance less than the indicated rated impedance of this unit are used.

If this occurs, follow the procedure outlines below:

1. Turn off the power.
2. Determine the cause of the problem and correct it.
3. Turn on the power once again after one minute.

Note

When the protection circuitry functions, the unit will not operate unless the power is first turned off and then on again.

■ BEFORE REPAIR AND ADJUSTMENT

1. Turn off the power supply and short-circuit of power supply capacitors (C401 ~ C404, 8200μF) at resistance (about 10Ω, 5W) in order to discharge the charged voltage. Do not short between C401 ~ C404 by screwdriver. It may damage the component.
2. Before turning on the power supply after completion of repair, slowly apply the primary voltage by using a power supply voltage controller to make sure that the consumed current at 120V, 60Hz in no-signal mode is 360mA ~ 820mA.

■ DISASSEMBLY INSTRUCTIONS

• How to remove the cabinet

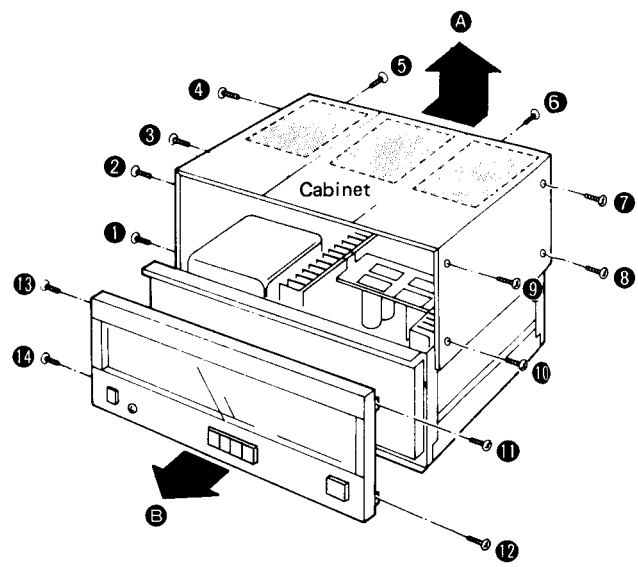
1. Remove the 10 setscrews (Fig. 1: ❶ ~ ⑩) of the cabinet.
2. Remove the cabinet in the direction of the arrow Ⓐ in Fig. 1.

• How to remove the front panel

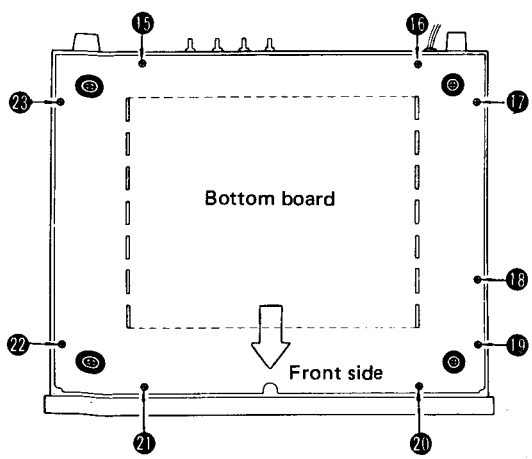
1. Remove the 4 setscrews (Fig. 1: ⑪ ~ ⑭) of the front panel.
2. Remove the front panel in the direction of the arrow Ⓑ in Fig. 1.

• How to remove the bottom board

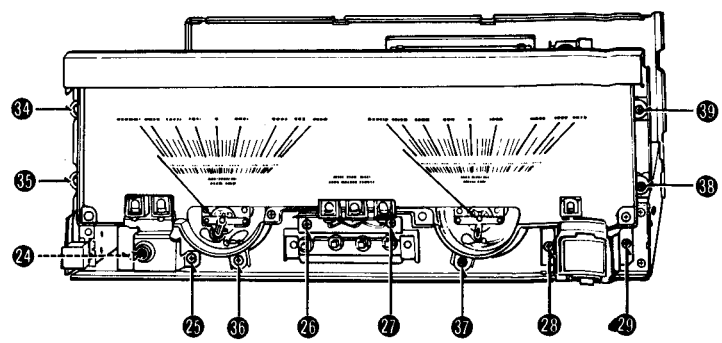
1. Remove the 9 setscrews (Fig. 2: ⑮ ~ ㉓) of the bottom board.



[Fig. 1]



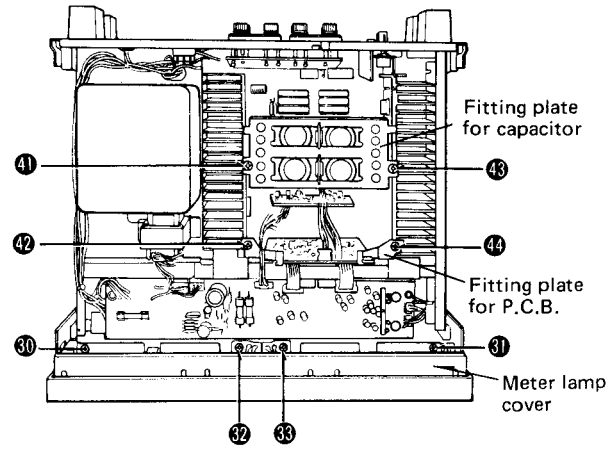
[Fig. 2]



[Fig. 3]

• How to remove the peak power meter

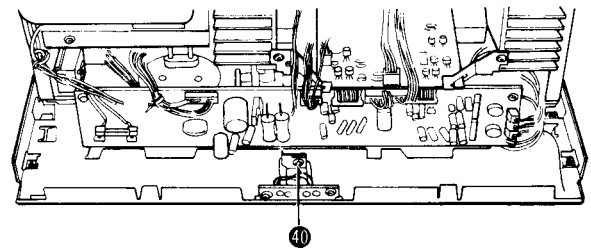
1. Remove the cabinet and front panel.
2. Remove the 6 setscrews (Fig. 3: ㉔ ~ ㉙), and then detuch the headphones jack, speakers indicator and computer drive indicator bracket from the chassis.
3. Remove the 2 setscrews (Fig. 4: ㉚ , ㉛) and then detuch the meter cover.
4. Remove the 2 setscrews (Fig. 4: ㉜ , ㉝) of the detuch the meter lamp P.C.B.
5. Remove the 6 setscrews (Fig. 3: ㉞ ~ ㉟) of the peak power meter.
6. Remove the 1 setscrew (Fig. 5: ㊵) and then detuch the peak power meter.



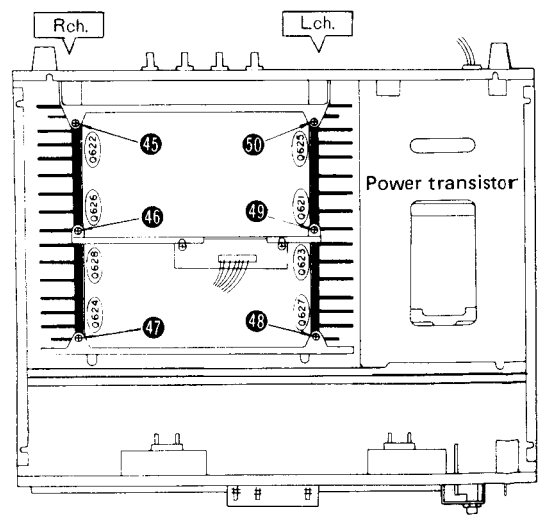
[Fig. 4]

• How to remove the power transistor

1. Remove the cabinet and bottom board.
2. Remove the 4 setscrews (Fig. 4: ㊶ ~ ㊹) and the detuch the fitting plate.
3. Unsolder of power transistor. (R or L channel) [Fig. 6]
4. Remove the 3 setscrews (Fig. 6: ㊺ ~ ㊼ or ㊽ ~ ㊿) of the heat sink.
5. Remove the heat sink and power transistor.
6. When fitting it, apply silicone compound (**SZZ0L15**) to both sides of mica plate. Also apply silicone compound (**SZZ0L15**) to the heads of temperature compensation/ bias control transistors (**Q337, 338**) and thermistor (**TH501**), then fit them to the heat sink with the retaining plate.



[Fig. 5]



[Fig. 6]

■ MEASUREMENTS AND ADJUSTMENTS

1. Idling (I_{CQ}) Adjustment (after reparing the main amp.) [Fig. 7]

(1) After the repair, set the sound volume to maximal before turning on the power switch, and connect nothing to the speaker terminals.
(2) Completely turn I_{CQ} control (VR301, VR302) counter-clockwise.
(3) Increase the voltage applied to the amplifier gradually from 0V by means of a power supply voltage controller, and make sure of the value in the Figure on page 4 before starting the adjustment.
(4) Connect the DC electronic voltmeter to TP301 (+) and TP303 (−) (L ch) or TP302 (+) and TP304 (−) (R ch).
(5) Adjust VR301 (L ch) or VR302 (R ch) so that the voltage is 4mV about 15 sec. after power switch "on".

In this set, I_{CQ} is controlled by microcomputer, and I_{CQ} a little more than the normal level is applied by "PREHEAT" for about 15 sec. after power ON. After that, the output level and transistor temperature are detected by "AUTO", thereby automatically controlling I_{CQ}.

2. Peak Power Meter Level Adjustment (after reparing the meter amp circuit or replacing the peak power meter.)

(1) Set the input level adjustment to the maximal position.
(2) Connect a dummy resistor of 8Ω or a speaker of 8Ω impedance and AC voltmeter to the speaker terminal.
(3) Apply 1kHz sine wave to the AUX/CD/VIDEO terminal and adjust the input so that the output to the speaker terminal is 28.3V.
(4) Adjust both channels of VR101 (L ch) and VR102 (R ch) so that the meter indicating is 100W.

3. Check of Muting Circuit During Power "on"–"off" Operation.

(1) Connect 8Ω load and AC voltmeter to the speaker terminal.
(2) Set the input level adjustment to the maximal position.
(3) Apply 1kHz sine wave, 0.5V to the speaker terminal.
(4) Make sure that output is delivered about 3 ~ 5 sec. after turning the power switch "on".
(5) Output should Immediately be gone when power switch is turned "off".

4. Check of DC Detection Circuit

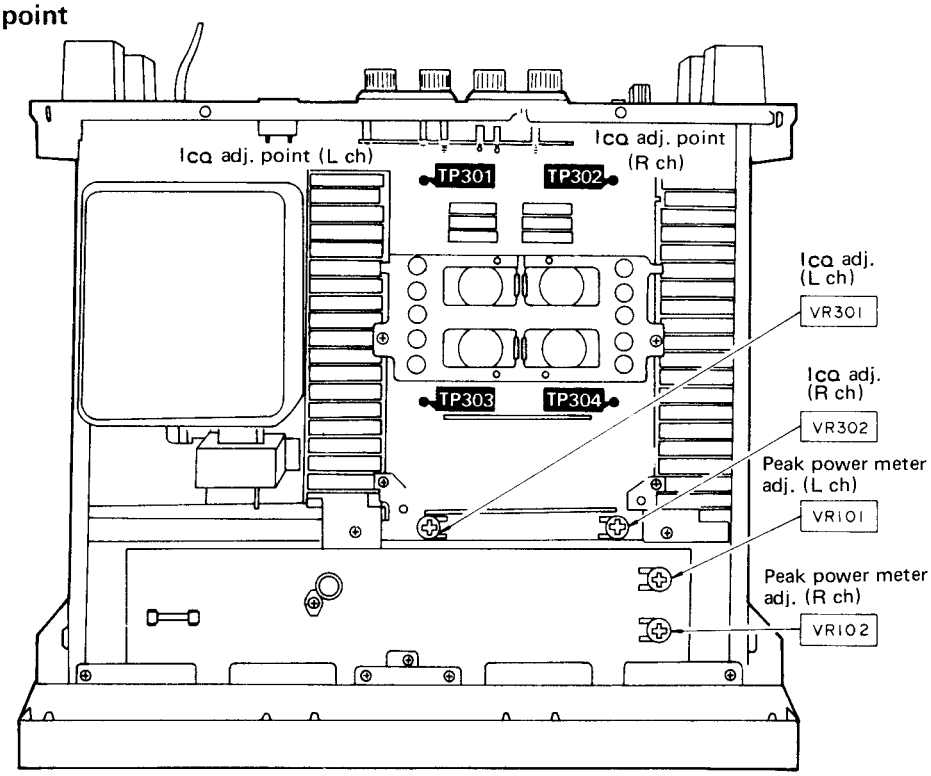
(1) Set the input level adjustment to the maximal position.
(2) Apply DC voltage +1V (to L ch), −1V (to R ch) to the DC input terminal.
(3) Make sure
- relay is off.
- "auto" indicator "on" goes out.
- "safety operation" indicator blinks.

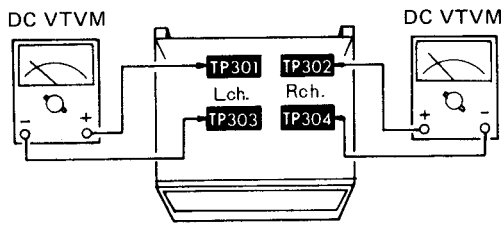
5. Check of Overload Detection and Protection Circuit

(1) Connect 8Ω (resistor or speaker) and AC voltmeter to the main speaker terminal.
(2) Main speaker selector is "on" position.
(3) Connect 0.33Ω (5W) resistor to the remote speaker terminal.
(4) Apply output signal of about 5V at 1kHz to input terminal.
(5) Make sure that no output is delivered when remote speaker switch is set to "on".

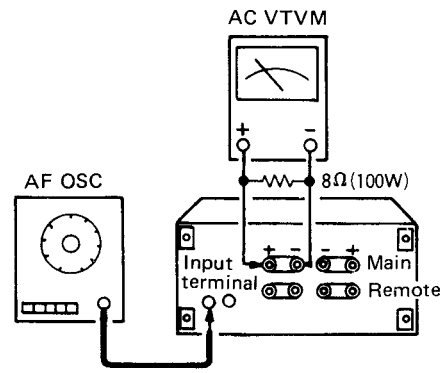
When the protection circuitry functions, the unit will not operate unless the power is first turned off and then on again.

• **Adjustment point**





[Fig. 7] Idling (ICQ) Adjustment



[Fig. 8] Peak power meter adjustment

■ RESISTORS & CAPACITORS

Notes:
1. Part numbers are indicated on most mechanical parts. Please use this part number for parts orders.
2. Important safety notice: Components identified by ⚠ mark have special characteristics important for safety. When replacing any of these components use only manufacturer's specified parts.
3. The "Ⓢ" mark is service standard parts and may differ from production parts.
4. The unit of resistance is Ω(ohm), K = 1000Ω, M = 1000kΩ.
5. The unit of capacitance is μF (microfarad). P = 10^{-6} μF
6. Bracketed indications in Ref. No. columns specify the area. Parts without these indications can be used for all areas.

Resistor Type	Wattage	Tolerance
ERD : Carbon	10 : 1/8W	J : ±5%
ERG : Metal Oxide	25 : 1/4W	G : ±5%
ERO : Metal Film	2 : 2W	
ERF : Non-flammable	S1 : 1/2W	
	3 : 3W	

ERD10TLJ□□□ → Chip type carbon

Capacitor Type	Voltage		Tolerance
	ECEA Type	Other	
ECEA : Electrolytic	0J : 6.3V	1H : 50V	D : ±0.5pF
ECCD : Ceramic	1A : 10V	KC : 400V AC	K : ±10%
ECKD : Ceramic	1C : 16V	2H : 500V	Z : +80%, −20%
ECQM : Polyester	1E : 25V		P : +100%, −0%
ECET : Electrolytic	1H : 50V		
ECEA...N : Non Polar Electrolytic	50 : 50V		
	25 : 25V		
	45 : 45V		
	2A : 100V		

● RESISTORS

Ref. No.	Part No.	Value
R21,22	ERD10TLJ223U	22K
R23,24	ERD10TLJ223U	22K
R25,26	ERD10TLJ333U	33K
R27,28	ERD10TLJ123U	12K
R29 Ⓢ	ERD25FJ472	4.7K
R30,31	ERD10TLJ103U	10K
R32 Ⓢ	ERD25FJ103	10K
R33	ERD10TLJ102U	1K
R34,35	ERD10TLJ104U	100K
R36	ERD10TLJ333U	33K
R37,38 Ⓢ	ERD25FJ822	8.2K
R39 Ⓢ	ERD25TJ394	390K
R40 Ⓢ	ERD25TJ223	22K
R41,42	ERD10TLJ223U	22K
R43	ERD10TL223U	22K
R44,45 Ⓢ	ERD25TJ223	22K
R46	ERD10TLJ392U	3.9K
R47 Ⓢ	ERD25FJ472	4.7K
R48	ERD10TLJ392U	3.9K
R49	ERD10TLJ153U	15K
R50	ERD10TLJ103U	10K
R101,102	ERO25CKF1962	19.6K
R103,104 Ⓢ	ERD25TJ824	820K
R105,106 Ⓢ	ERD25TJ104	100K
R107,108 Ⓢ	ERD25FJ102	1K
R109,110 Ⓢ	ERD25FJ471	470
R111,112 Ⓢ	ERD25FJ221	220
R113,114 Ⓢ	ERD25FJ222	2.2K
R201,202 Ⓢ	ERD25FJ222	2.2K
R203,204 Ⓢ	ERD25TJ224	220K

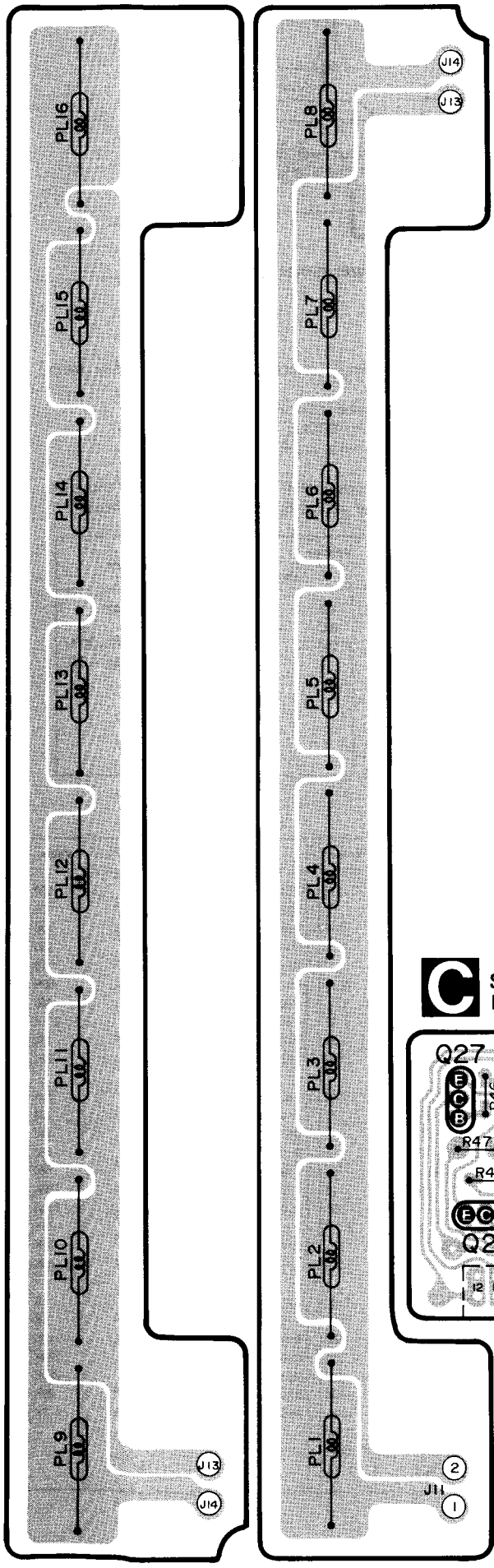
Ref. No.	Part No.	Value
R301,302 Ⓢ	ERD25FJ221	220
R305,306 Ⓢ	ERD25FJ272	2.7K
R307,308 Ⓢ	ERD25FJ392	3.9K
R309,310 Ⓢ	ERD25FJ392	3.9K
R311,312 Ⓢ	ERD25TJ393	39K
R313,314 Ⓢ	ERD25FJ103	10K
R315,316 Ⓢ	ERD25FJ330	33
R317,318 Ⓢ	ERD25TJ393	39K
R319,320 Ⓢ	ERD25FJ103	10K
R321,322 Ⓢ	ERD25FJ561	560
R323,324 Ⓢ	ERD25FJ471	470
R325,326 Ⓢ	ERD25FJ151	150
R327,328 Ⓢ	ERD25FJ151	150
R329,330 Ⓢ	ERD25FJ102	1K
R331,332 Ⓢ	ERD25FJ821	820
R333,334 Ⓢ	ERD25FJ102	1K
R335,336 Ⓢ	ERD25FJ102	1K
R337,338 Ⓢ⚠	ERD25FJ681	680
R339,340 Ⓢ⚠	ERD25FJ681	680
R341,342 Ⓢ⚠	ERD25FJ101	100
R343,344 Ⓢ⚠	ERD25FJ101	100
R345,346 Ⓢ⚠	ERD25FJ101	100
R347,348 Ⓢ⚠	ERD25FJ101	100
R349,350 Ⓢ⚠	ERD25FJ102	1K
R351,352 Ⓢ	ERD25FJ102	1K
R353,354 Ⓢ	ERD25TJ333	33K
R355,356 Ⓢ	ERD25TJ104	100K
R357,358 Ⓢ	ERD25TJ104	100K
R359,360 Ⓢ	ERD25TJ223	22K
R361,362 Ⓢ	ERD25TJ823	82K

Ref. No.	Part No.	Value
R363,364 Ⓢ⚠	ERD25FJ271	270
R365,366 Ⓢ⚠	ERD25FJ2R2	2.2
R367,368 Ⓢ⚠	ERD25FJ2R2	2.2
R369,370 Ⓢ⚠	ERD25FJ2R2	2.2
R371,372 Ⓢ⚠	ERD25FJ2R2	2.2
R373,374 ⚠	ERF3RKR33	0.33
R375,376 ⚠	ERF3RKR33	0.33
R377,378 ⚠	ERF3RKR33	0.33
R379,380 ⚠	ERF3RKR33	0.33
R381,382 Ⓢ	ERD25TJ224	220K
R383,384 Ⓢ	ERD25TJ224	220K
R385,386 Ⓢ⚠	ERD25FJ3R3	3.3
R387,388 Ⓢ⚠	ERD25FJ3R3	3.3
R389,390 Ⓢ⚠	ERD25FJ100	10
R391,392 Ⓢ	ERG2ANJ100	10
R393,394 Ⓢ⚠	ERD25FJ100	10
R395,396 Ⓢ⚠	ERD25FJ561	560
R397,398 Ⓢ⚠	ERD25FJ222	2.2K
R401,402	ERD2FCG5R6	5.6
R403,404	ERD2FCG5R6	5.6
R405,406 Ⓢ	ERD25FJ472	4.7K
R501,502 Ⓢ⚠	ERD25FJ222	2.2K
R503,504 Ⓢ⚠	ERD25FJ681	680
R505,506 Ⓢ⚠	ERD25FJ331	330
R507,508 Ⓢ	ERD25TJ183	18K
R509 Ⓢ	ERD25TJ183	18K
R511 Ⓢ	ERD25TJ104	100K
R512 Ⓢ	ERD25TJ224	220K
R513 Ⓢ	ERD25TJ223	22K
R514 Ⓢ	ERD25FJ472	4.7K

Ref. No.	Part No.	Value
R515 ⚠	ERDS1FJ391	390
R516 ⚠	ERDS1FJ331	330
R517 ⚠	ERDS1FJ391	390
R518 Ⓢ⚠	ERD25FJ181	180
R519 Ⓢ⚠	ERD25FJ100	10
R520 Ⓢ	ERD25TJ683	68K
R601,602 Ⓢ⚠	ERD25FJ151	150
R603 Ⓢ	ERD25FJ222	2.2K
R604 Ⓢ⚠	ERD25FJ151	150
R605 Ⓢ	ERD25TJ333	33K
R606 Ⓢ	ERD25TJ223	22K
R607,608 Ⓢ	ERG3ANJ331	330
R609 Ⓢ⚠	ERD25FJ181	180
R701,702 Ⓢ⚠	ERD25FJ331	330
R703,704 Ⓢ⚠	ERD25FJ681	680
R705,706 Ⓢ	ERD25TJ124	120K
R707,708 Ⓢ	ERD25FJ562	5.6K
R709,710 Ⓢ	ERD25TJ333	33K
R711,712 Ⓢ	ERD25TJ333	33K
R713,714 Ⓢ	ERD25TJ333	33K
R715,716 ⚠	ERDS1FJ102	1K
R717,718 ⚠	ERDS1FJ102	1K
R801,802 Ⓢ	ERD25FJ103	10K
R803,804 Ⓢ	ERD25TJ224	220K
R805,806 Ⓢ	ERD25TJ224	220K
R851,852 Ⓢ	ERD25TJ393	39K
R853,854 Ⓢ	ERD25FJ122	1.2K

■ PRINTED CIRCUIT BOARDS

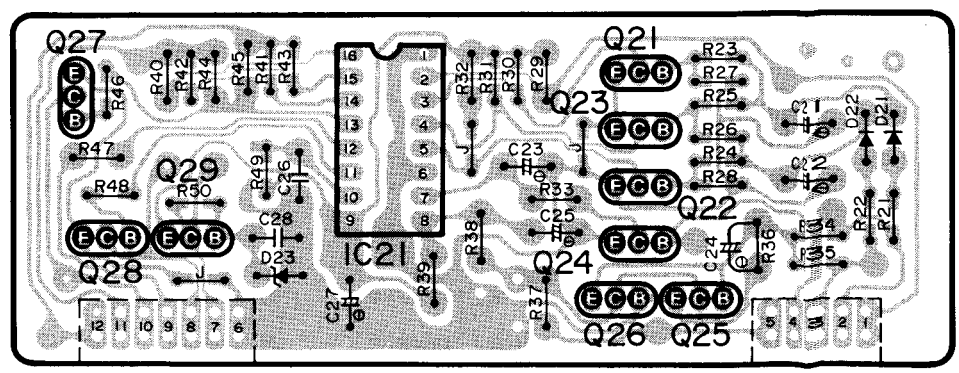
PEAK POWER METER P.C.B.



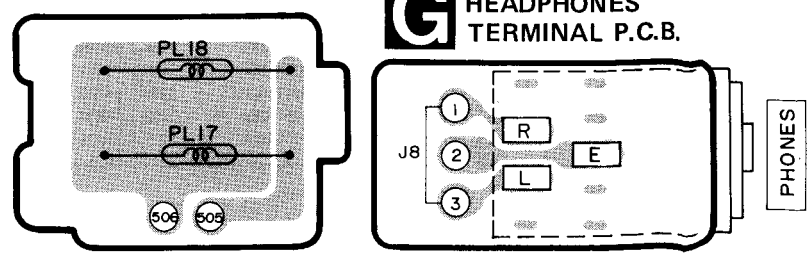
● CAPACITORS

Ref. No.		Part No.	Value
C21,22		ECEA1EU3R3	3.3
C23		ECEA1CU100	10
C24		ECEA1CU101	100
C25		ECEA1HUR47	0.47
C26	Ⓢ	ECCD1H121K	120P
C27		ECEA0JU101	100
C28	Ⓢ	ECKD1H223ZF	0.022
C101,102	⚠	ECEA1EN3R3S	3.3
C103,104		ECEA1HUR47	0.47
C105,106		ECEA1HUR47	0.47
C107,108		ECEA1CU470	47
C201,202	⚠	ECEA1HN2R2S	2.2
C203,204	Ⓢ	ECCD1H181K	180P
C301,302	Ⓢ	ECCD1H101K	100P
C303,304	Ⓢ	ECKD1H681KB	680P
C307,308	Ⓢ	ECCD2H070D	7P
C309,310	Ⓢ	ECCD2H070D	7P
C311,312	Ⓢ	ECCD2H270K	27P
C313,314	Ⓢ	ECCD2H270K	27P
C315,316		ECEA1HU330	33
C317,318		ECEA2AU010	1
C321,322		ECEA1CU100	10
C323,324		ECEA1EU4R7	4.7
C325,326	Ⓢ⚠	ECEA25N4R7	4.7
C327,378	Ⓢ	ECCD1H120KC	12P
C331,332	Ⓢ	ECKD1H681KB	680P
C333,334	Ⓢ	ECKD1H681KB	680P
C339,340		ECQM1H473KV	0.047
C401,402		ECET1KV822Z	8200
C403,404		ECET1KV822Z	8200
C405		ECEA1VU102	1000
C406		ECEA1VU471	470
C407,408		ECEA1EU330	33
C409		ECEA1EU3R3	3.3
C410	Ⓢ	ECKD1H103ZF	0.01
C501		ECEA1HU010	1
C502		ECEA0JU470	47
C503	Ⓢ	ECKD1H103ZF	0.01
C504		ECEA1HU010	1
C701,702		ECEA1CU100	10
C703,704	Ⓢ	ECKD1H103ZF	0.01
C801,802	Ⓢ	ECCD1H101K	100P
C803,804	Ⓢ	ECKD1H221KB	220P
C805,806	Ⓢ	ECKD1H221KB	220P
C1001	⚠	ECKDKC103PF2	0.01

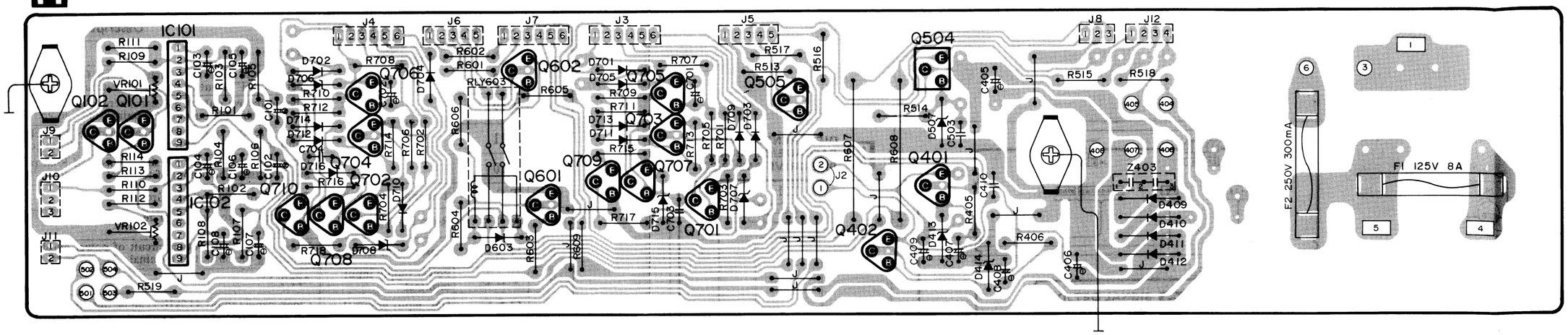
C SIGNAL DET./DC DET./POWER ON-OFF DET./ Ico CONTROL P.C.B.



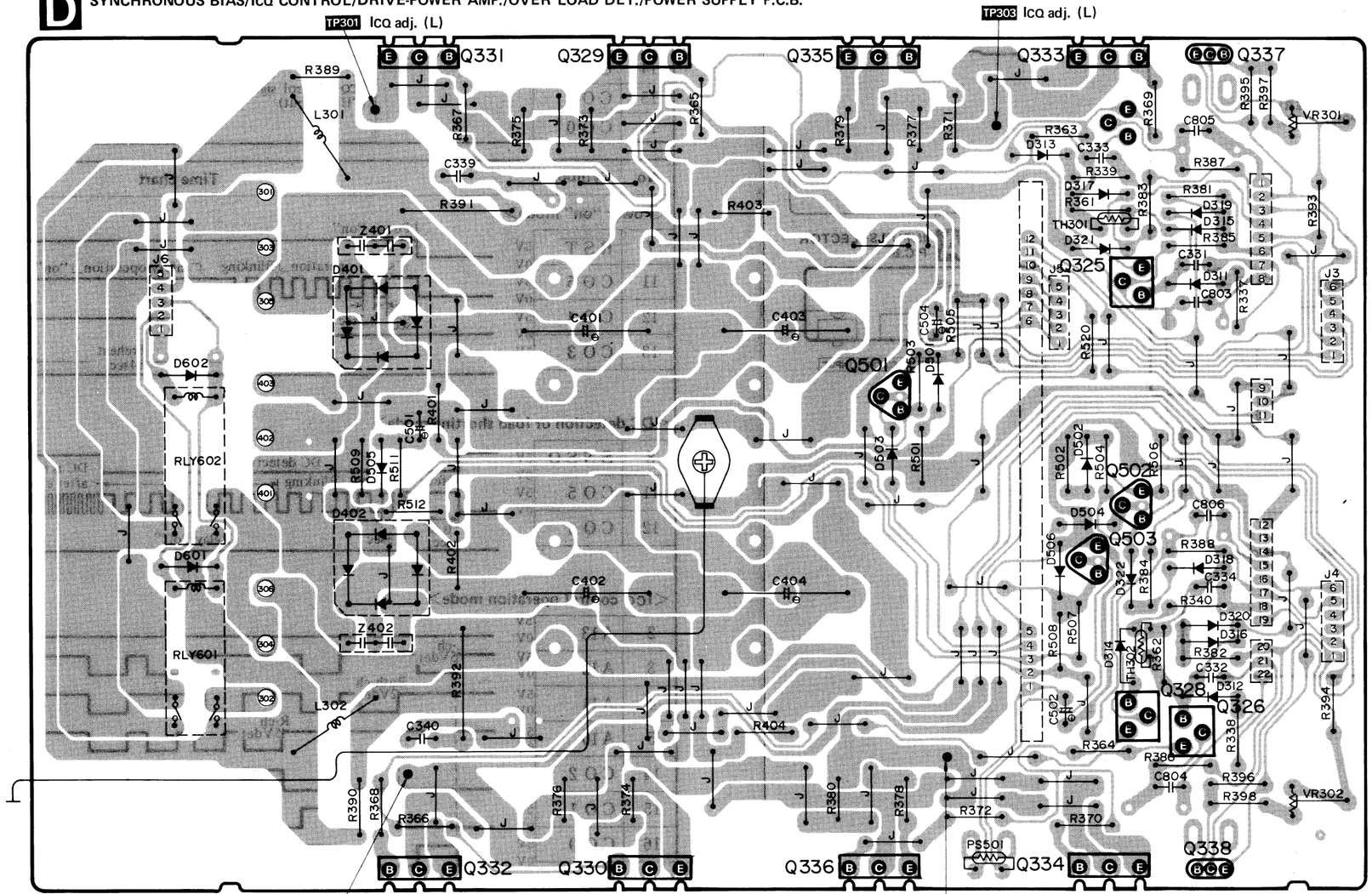
G HEADPHONES TERMINAL P.C.B.



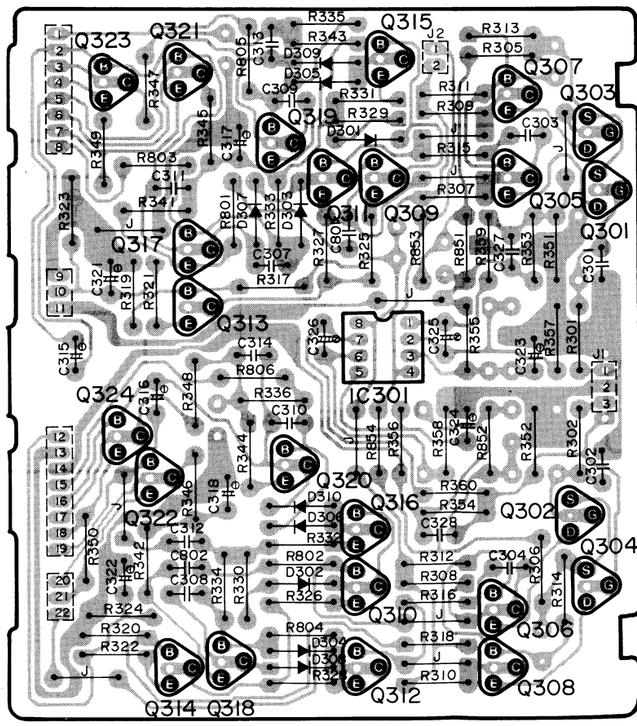
H CURRENT DET./METER DRIVE/REGULATOR/RELAY DRIVE/POWER SUPPLY P.C.B.



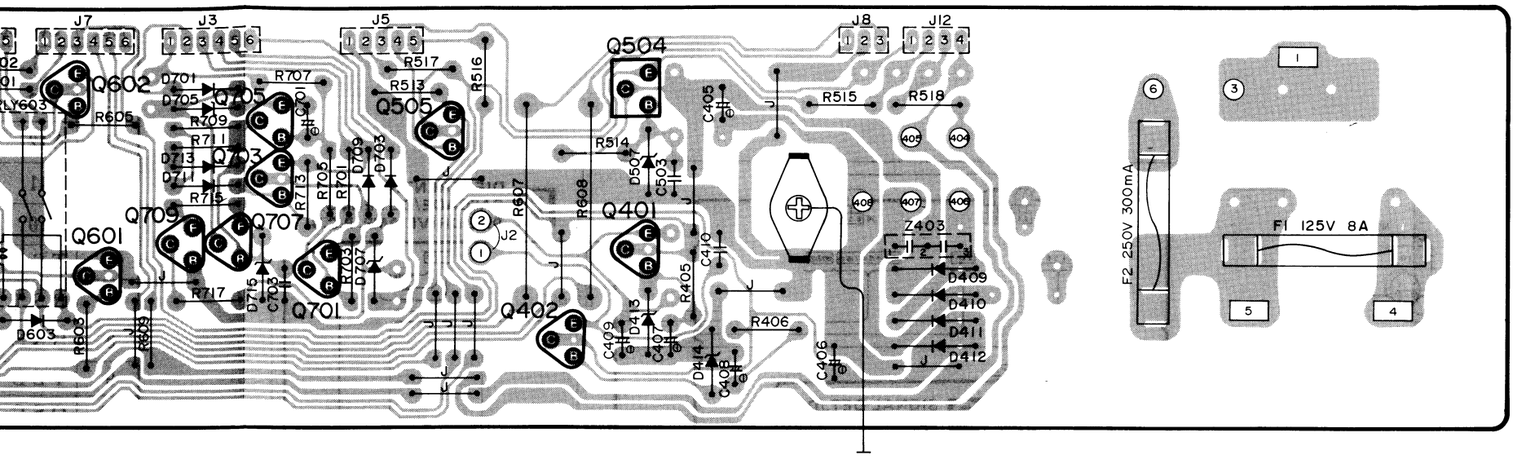
D SYNCHRONOUS BIAS/ICQ CONTROL/DRIVE-POWER AMP./OVER LOAD DET./POWER SUPPLY P.C.B.



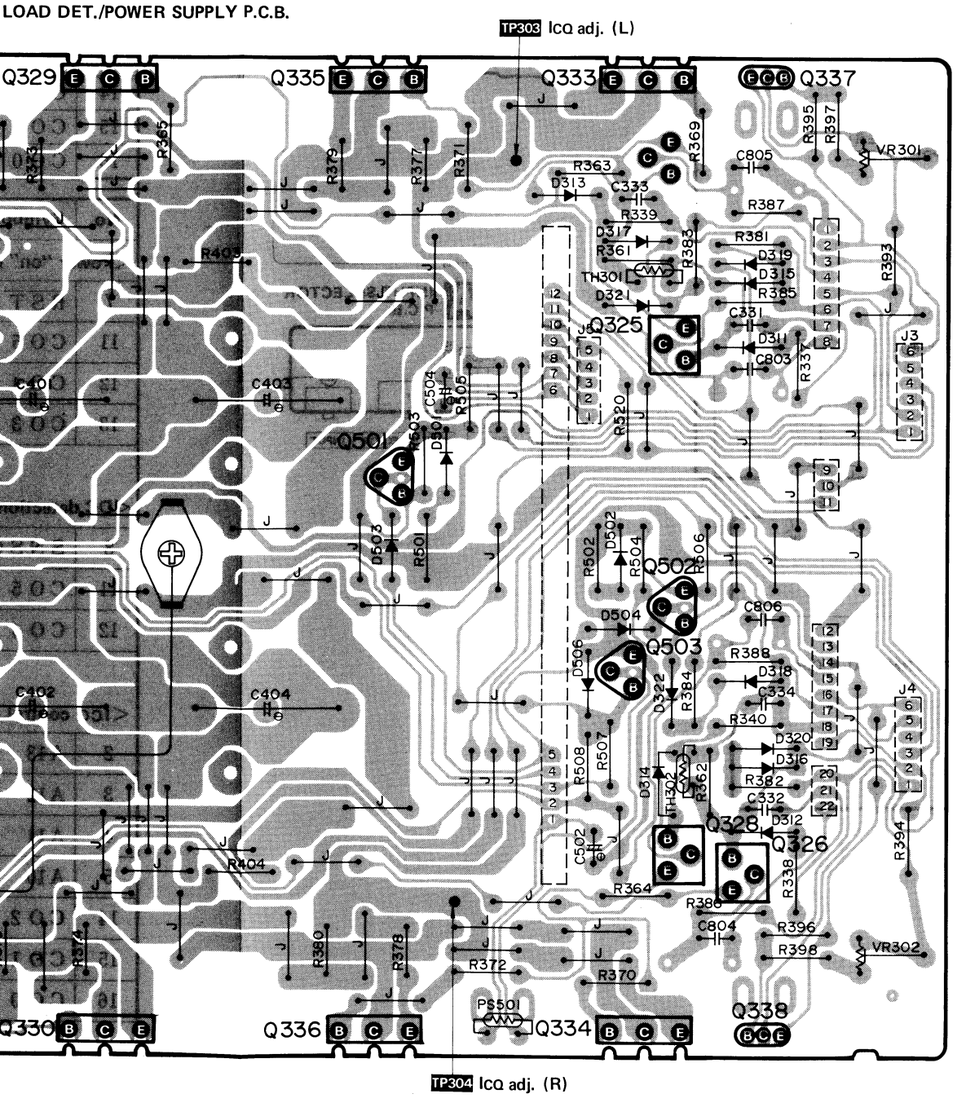
B DIFFERENTIAL AMP/CASCADE/DC SERVO/ PRE DRIVE AMP. P.C.B.



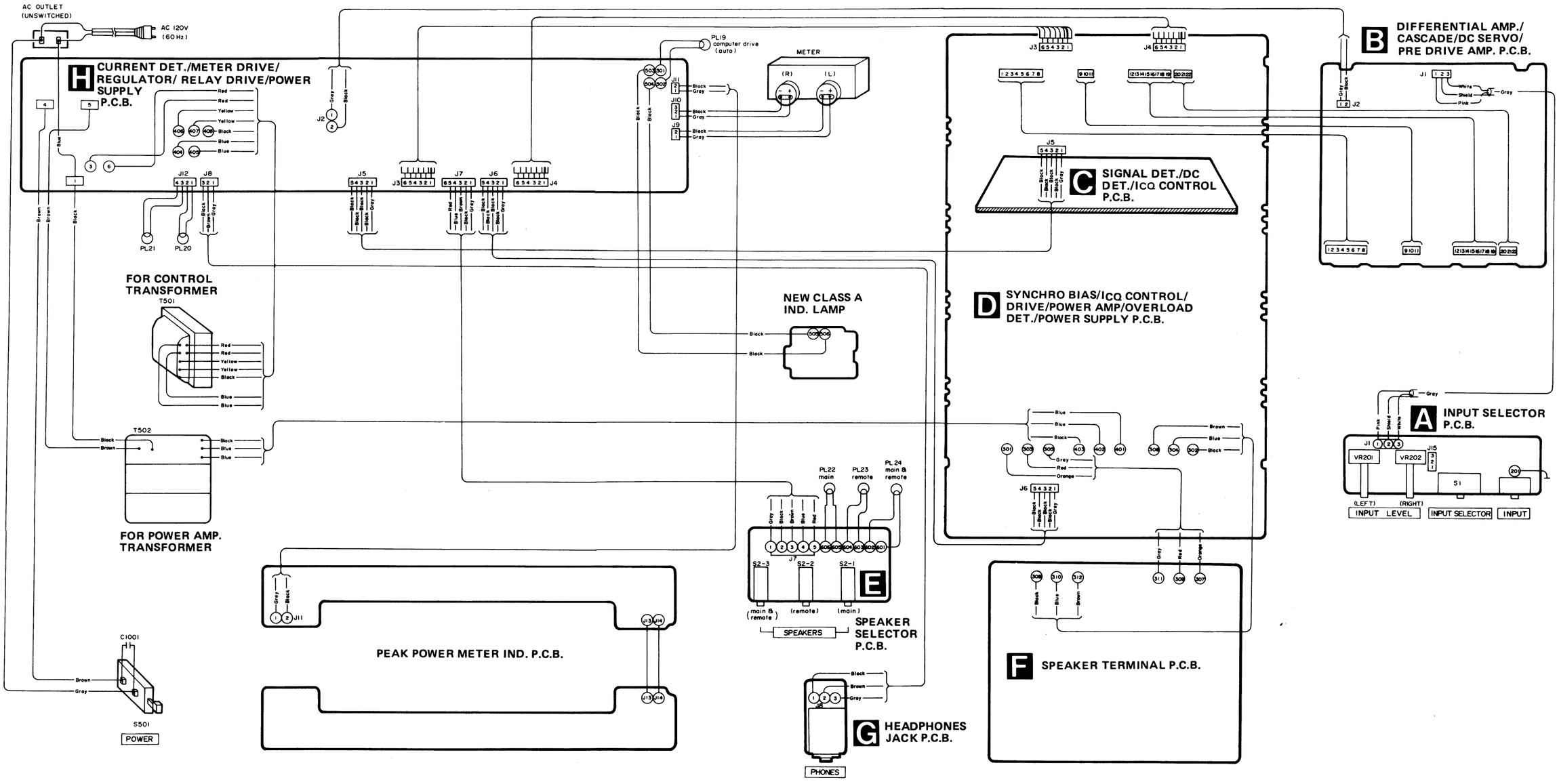
WER SUPPLY P.C.B.



LOAD DET./POWER SUPPLY P.C.B.



■ CIRCUIT BOARDS AND WIRING CONNECTION DIAGRAM (Top View)

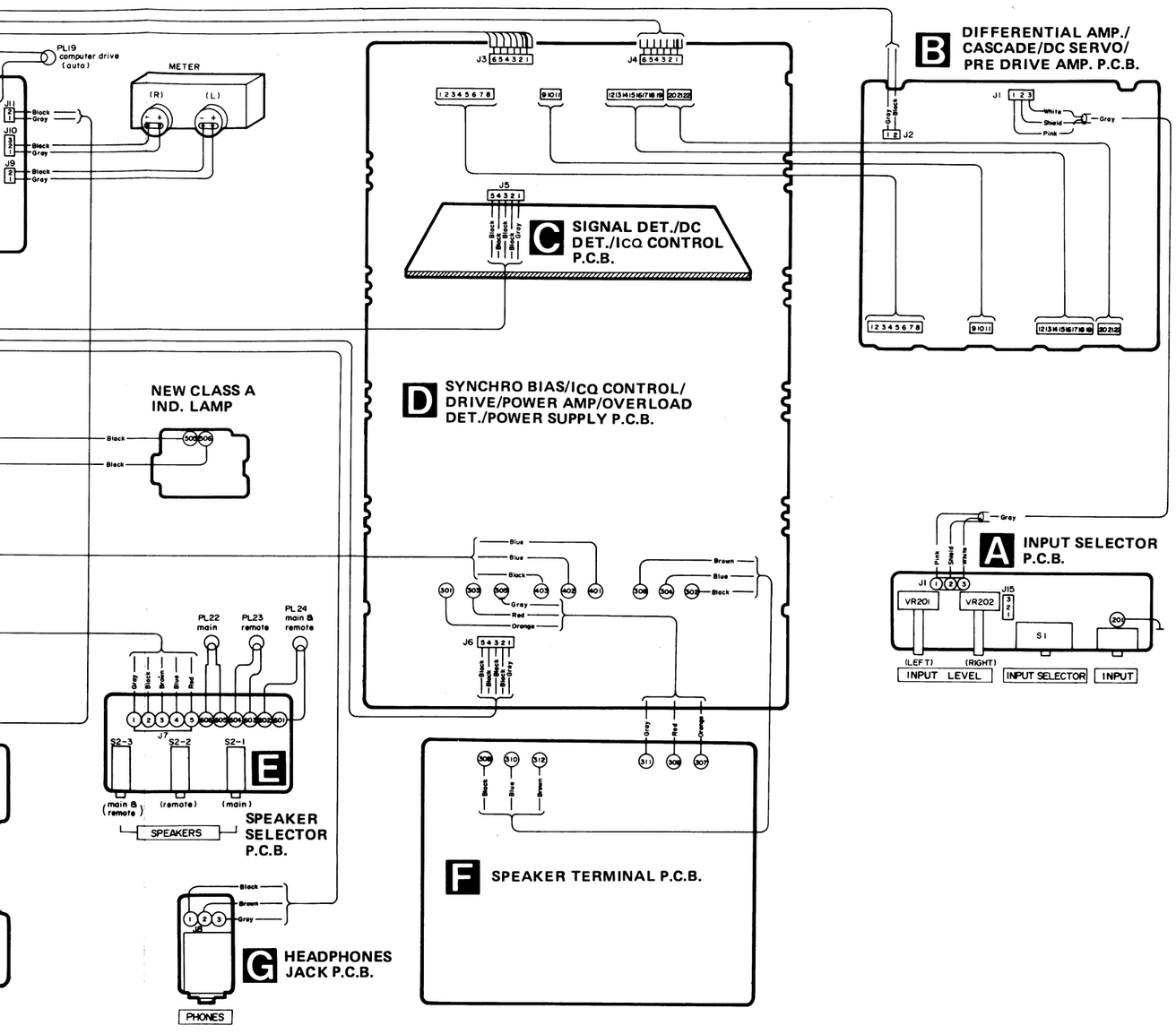


■ TERMINAL

No.	Symbo
1	VSS
2	A13
3	A12
4	A11
5	A10
6	TST
7	$\overline{RST}$
8	SNS
9	VDD
10	OSC
11	CO5
12	CO4
13	CO3
14	CO2
15	CO1
16	CO0

No.	Symbo
<Power "on"	
7	$\overline{RST}$
11	CO5
12	CQ4
13	CO3
<DC detection	
8	SNS
11	CO5
12	CO4
<ICQ control	
2	A13
3	A12
4	A11
5	A10
14	CO2
15	CO1
16	CO0

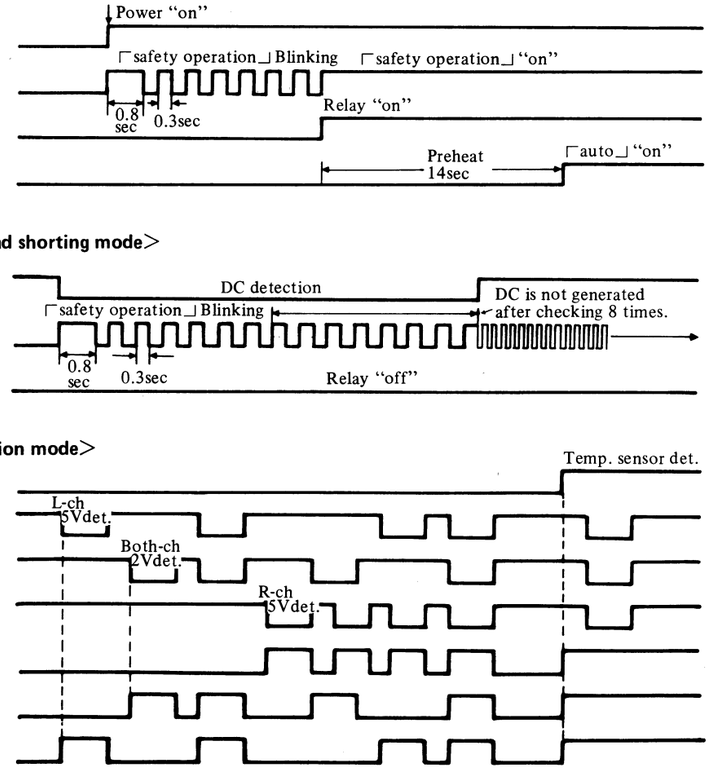
op View)



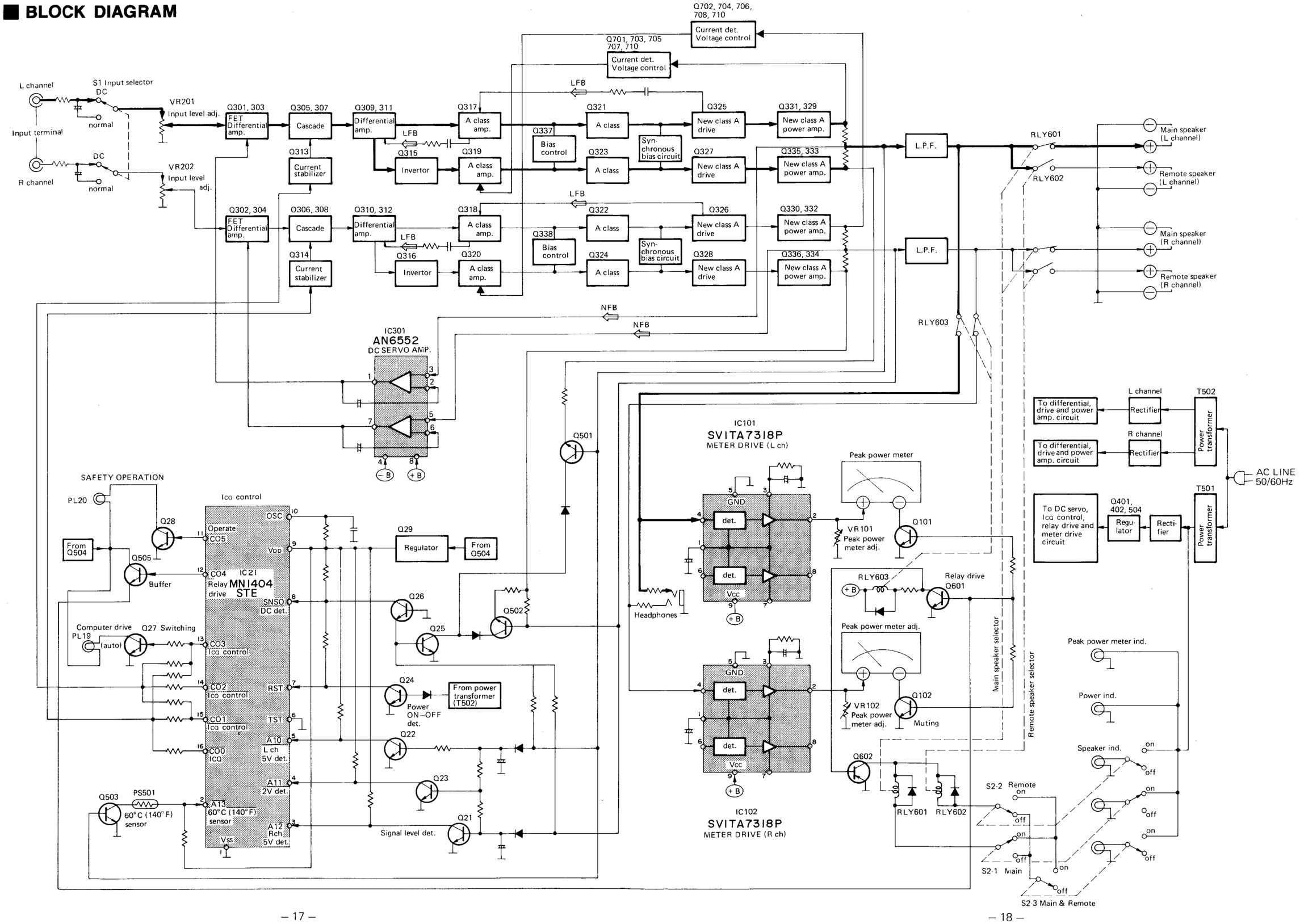
■ TERMINAL NAMES AND FUNCTION OF ICQ CONTROL (MN1404STE)

No.	Symbol	Name of block	Description of terminal
1	VSS	Power supply input terminal	Grounded. (0V)
2	A13	Input port A	Temperature detection circuit. When 60°C (140°F) sensor of power amplifier operates, "H" is put in causing the outputs of terminals 14 ~ 16 to go "H".
3	A12		When effective output 5V signal sensor of L-ch power amplifier operates, "L" is put in causing the output of terminal 14 to go "H".
4	A11		When effective output 2V signal sensors of both-ch power amplifiers operate, "L" is put in causing the output of terminal 15 to go "H".
5	A10		When effective output 5V signal sensor of R-ch power amplifier operates, "L" is put in causing the output of terminal 16 to go "H".
6	TST	Test input terminal	Terminal for testing LSI. (Ground)
7	$\overline{RST}$	Reset input terminal	All outputs are cleared or reset with input at "L". (It is connected to power supply circuit)
8	SNSO	Sensor input terminal	When overload detection circuit of power amplifier output operates, "H" is put in causing the output of terminal 12 to go "L".
9	VDD	Power supply input terminal	Apply 5V.
10	OSC	OSC input terminal	Clock signal (about 415kHz) can be obtained by internal oscillation circuit.
11	CO5	Output port C	When protection circuit operates, "H" and "L" outputs are repeated and "safety operation" indicator blinks.
12	CO4		Output relay and meter relay turn ON with "H" output.
13	CO3		Indicator "auto" lights up at "H".
14	CO2		ICQ control signal is emitted from A input port (temp. sensor, signal sensor). ("H" output)
15	CO1		
16	CO0		

No.	Symbol	Time chart
<Power "on" mode>		
7	$\overline{RST}$	5V / 0V
11	CO5	5V / 0V
12	CQ4	5V / 0V
13	CO3	5V / 0V
<DC detection or load shorting mode>		
8	SNSO	5V / 0V
11	CO5	5V / 0V
12	CO4	5V / 0V
<ICQ control operation mode>		
2	A13	5V / 0V
3	A12	5V / 0V
4	A11	5V / 0V
5	A10	5V / 0V
14	CO2	5V / 0V
15	CO1	5V / 0V
16	CO0	5V / 0V



■ BLOCK DIAGRAM



■ DESCRIPTION OF Icq CONTROL CIRCUIT

- **Signal and temperature detection (See Fig. 9.)**

1. Music signal of power amplifier is applied to IC21 terminal ③ (⑤) of D21 (D22) and Q21 (Q22). When the signal rectified by D21 (D22) and C21 (C22) exceeds about 5V, Q21 (Q22) turns "on" causing "L" input to be applied to IC21 terminal ③ (⑤). Also, when the signal is over 2V, Q23 turns "on" causing "L" put to be applied to IC21 terminal ④. As "L" is put into IC21 terminals ③ ~ ⑤, the outputs of terminals ⑭ ~ ⑯ go "H" to make Icq control.
2. PS501 is the thermistor (positor) for heat sink temperature detection which detects the temperature [60°C (140°F)] of the heat sink. When the heat sink temperature becomes [60°C (140°F)], the resistance of PS501 increases causing "H" input to be applied to IC21 terminal ②. As "H" is put into IC21 terminal ②, the outputs of IC21 terminals ⑭ ~ ⑯ go "H" to make Icq control.

- **Overload detection circuit (See Fig. 9.)**

When speaker terminals are shorted, great current flows to R503 (R504) causing the base potential of Q501 (Q502) (overload detection circuit) to increase, then the base voltage of Q501 (Q502) rises and Q501 (Q502) turns "on". With Q501 (Q502) turned ON, both Q25 and Q26 turn "on" causing "L" input to be applied to IC21 terminal ⑧. Then, "L" output is applied to IC21 terminals ⑫ and ⑬. As terminal ⑫ goes "L", Q501, Q601 and Q602 turn "off" causing RLY601 ~ 603 to turn "off". When terminal ⑬ goes "L", Q27 turns "off" causing "auto" indicator to turn "off". Also, "H" and "L" outputs are delivered from terminal ⑪ at 0.1 sec. intervals, then the "safety operation" indicator blinks.

■ CURRENT DETECTION TYPE VOLTAGE CONTROL CIRCUIT

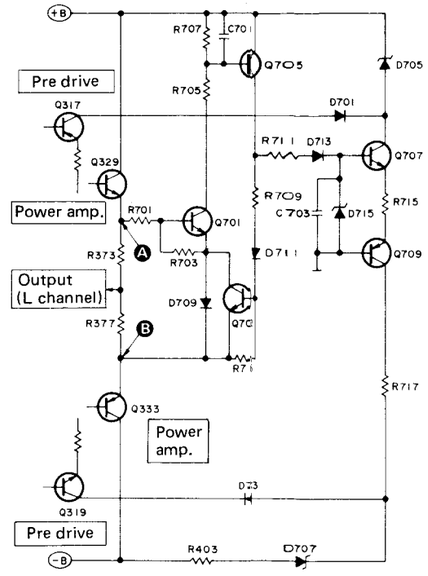
① With 4Ω speaker connected, great current flows to the power transistor, then voltage is generated between Ⓐ – Ⓑ, and Q701 turns "on" when the voltage exceeds V1. **(Note 1)**

② When Q701 turns "on", current flows to R707 and R705, causing Q705 to turn "on".

③ As (+B) voltage comes to the collector of Q705, each of Q703, Q707 and Q709 turns "on", and voltage is applied to D715, D705 and D707, then the collector voltage of pre-drive Q317 and Q319 is controlled to a degree 16V lower than (+B) voltage. Controlling the collector voltage of Q317 and Q319 is intended to control the great current of power transistor.

④ As Q703 is "on", even if the current of power transistor is then reduced, ③ is not reset allowing output control to continue when the voltage between Ⓐ – Ⓑ is higher than V2. **(Note 2)**

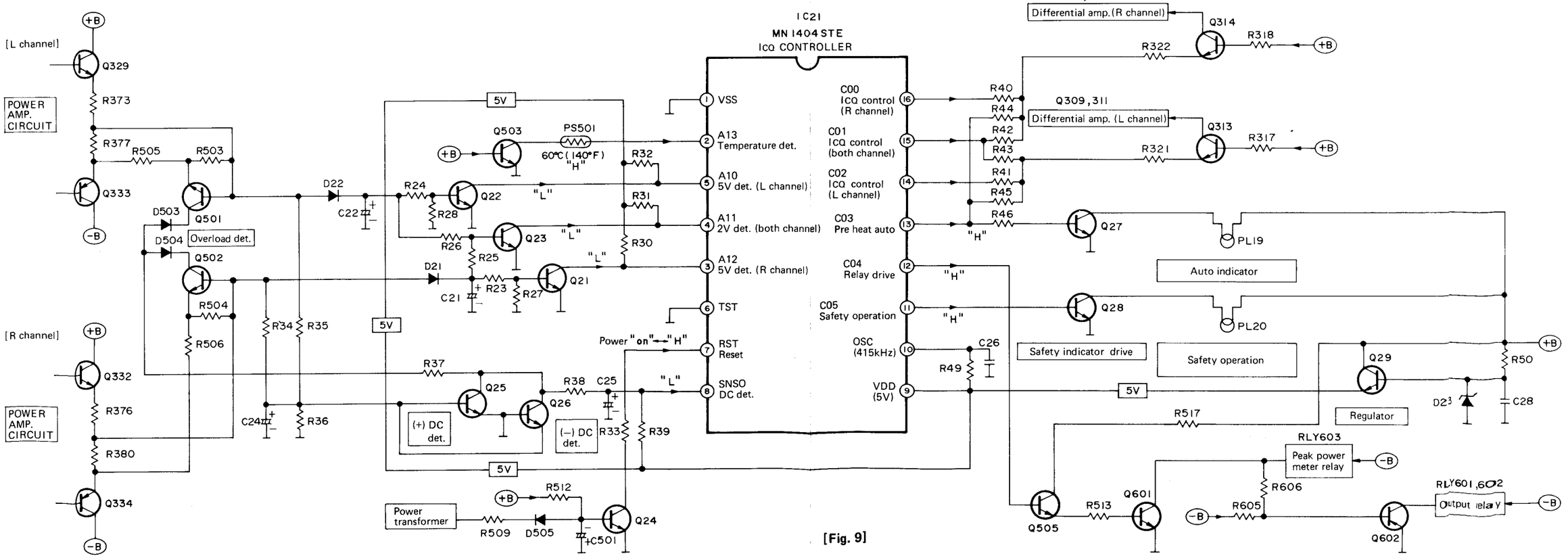
⑤ When the voltage between Ⓐ – Ⓑ is lower than V2 **(Note 2)** as the current of power transistor is reduced, then Q701 turns "off" and ③ is reset.



[Note 1] $V1=\frac{R1+R2}{R2}\cdot Vbe + VF$

[Note 2] $V2=\frac{R1+R2}{R2}\cdot Vbe + Vsat$

R1 : Resistance value of R701
R2 : Resistance value of R703
Vbe : Base – emitter voltage to turn Q701 "on"
VF : Forward voltage of Q709
V sat : Collector – emitter saturation voltage of Q701



[Fig. 9]

A INPUT SELECTOR CIRCUIT

SI (INPUT SELECTOR)

Lch INPUT Rch

Input level control

B DIFFERENTIAL AMP./CASCADE/DC SERVO/ PRE DRIVE AMP. CIRCUIT

Q317,318 2SA1370 PRE DRIVE

Q305~308 2SC1815 CASCADE

Q301~304 2SK117 FET DIFFERENTIAL AMP

Q309~312 2SC1845 DIFFERENTIAL AMP

Q315,316 2SA1370 CURRENT MIRROR

Q319,320 2SC3467 PRE DRIVE

Q313,314 2SC1815 CURRENT STABILIZER

IC301 AN6552 DC SERVO

Q321,322 2SC3467 DRIVE

Q323,324 2SA1370 DRIVE

LFB NFB

D301~306 MA150

D307~310 MA182

BIAS CONTROL CIRCUIT

C SIGNAL DET./DC DET./ POWER ON-OFF DET. /Icq CONTROL CIRCUIT

Q27 2SC1815 INDICATOR DRIVE

Q28 2SC1815 INDICATOR DRIVE

D23 MA1062M 6.2V ZENER

IC21 MN1404STE Icq CONTROLLER

Q29 2SC1815 REGULATOR

Q21 2SC1815 5V SIGNAL DETECTOR

Q22 2SC1815 5V SIGNAL DETECTOR

Q23 2SC1815 2V SIGNAL DETECTOR

D21,22 MA162A

Q24 2SC1815 POWER ON/OFF DETECTOR

Q25,26 2SC1815 DC DETECTOR

D SYNCHRO BIAS/Icq CONTROL/DRIVE/POWER AMP./ OVERLOAD DET./POWER SUPPLY CIRCUIT

D311~314 0A90A-R SYNCHRONOUS BIAS

Icq adj. TP301 TP302 TP303 TP304

Q337 2SC1815 Icq BIAS CONTROL

Q333~336 2SA1301 POWER AMP

Q338 2SC1815 Icq BIAS CONTROL

Q325,326 2SC3298A CLASS A DRIVE

Q327,328 2SA1306A CLASS A DRIVE

Q329~332 2SC3280 POWER AMP

Q501,502 2SC1845 OVERLOAD DETECTOR

Q503 2SC1815 Icq CONTROL

D315~318 0A90A-R

D319~322 MA27W-A

D401,402 SVDS10VB20F RECTIFIER

D501~505 MAI62A

D506,601,602 MAI50

Temperature det.
60°C(140°F) [25°C(77°F) — under 300Ω / 60°C(140°F) — over 770Ω]

Main speaker protection relay

Remote speaker protection relay

RLY601 RLY602

E SPEAKER SELECTOR CIRCUIT

Main & Remote speaker selector

Remote speaker selector Main speaker selector

(12V 0.04A) INDICATOR

F SPEAKER TERMINAL CIRCUIT

L ch MAIN R ch SPEAKERS

L ch REMOTE R ch

G HEADPHONES JACK CIRCUIT

PEAK POWER METER

HEADPHONES

Lch Rch

Q602 2SA1015 RELAY DRIVE

H CURRENT DET./METER DRIVE/REGULATOR/ RELAY DRIVE/POWER SUPPLY CIRCUIT

Q701,702 2SC3467 CURRENT DETECTOR

Q705,706 2SA1370 SWITCHING

Q709,710 2SA1124 VOLTAGE CONTROL

Q703,704 2SC1815 SWITCHING

Q707,708 2SC2632 SWITCHING

D701~704 MAI82

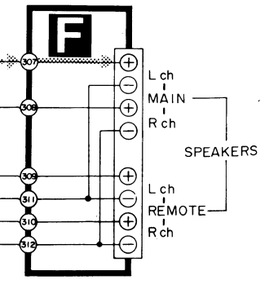
D709~710 MA27B

D711~714 MA162A

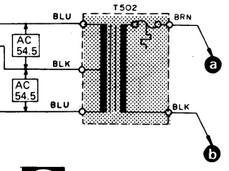
D715,716 SVDMZ322A 22V ZENER

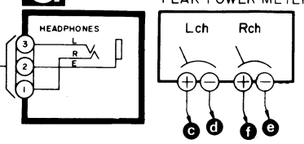
D705~708 SVDMZ316B 16V ZENER

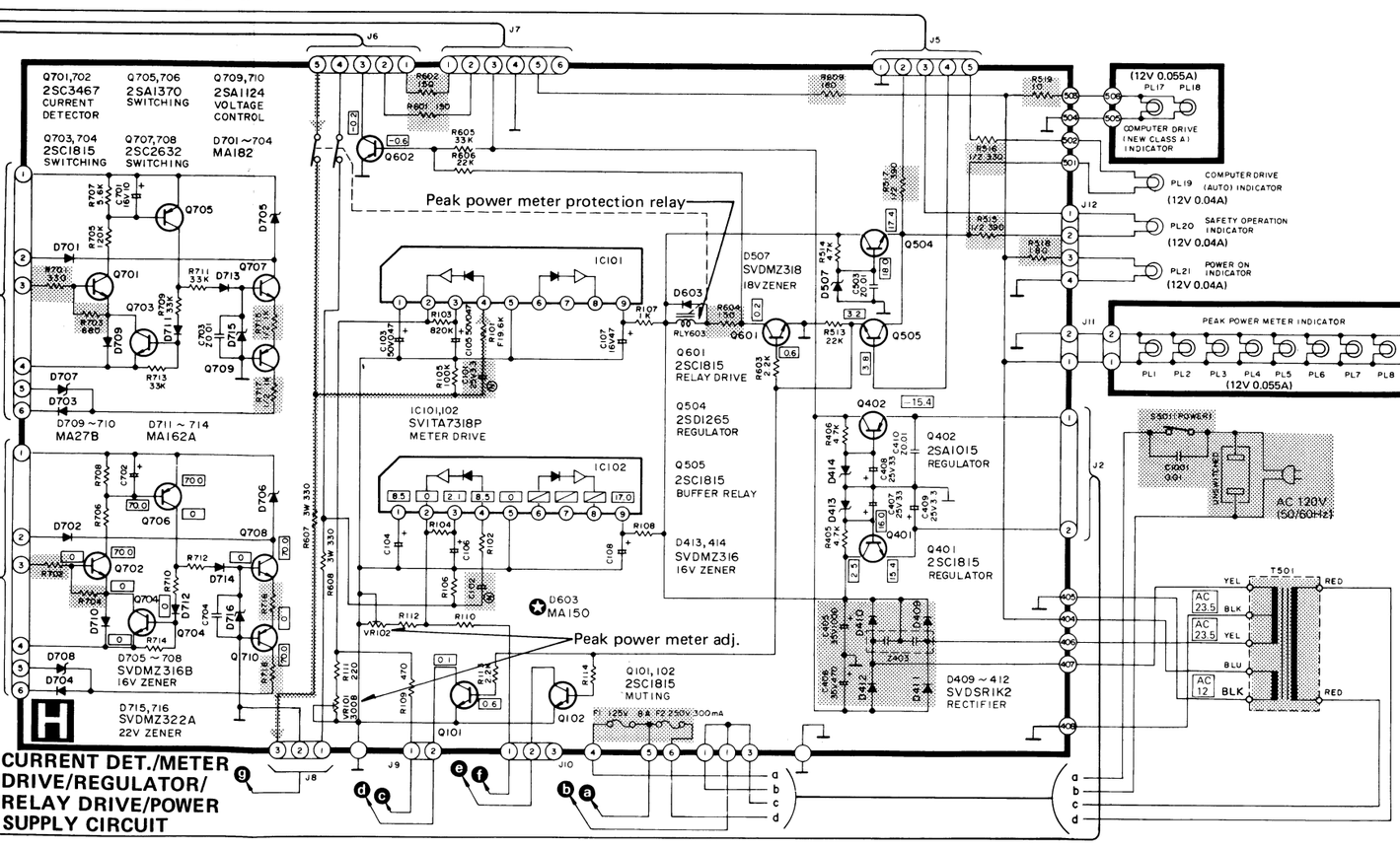
10 11 12 13 14 15 16



SPEAKER TERMINAL CIRCUIT







■ SCHEMATIC DIAGRAM

(This schematic diagram may be modified at any time with the development of new technology.)

- The part No. of transistors, IC and diodes mentioned in the schematic diagram stand for production part No. Regarding the Part No. with ✪ mark, the production part No. are different from the replacement part No. Therefore, when placing an order for replacement parts, pleases use the part No. in the replacement parts list.

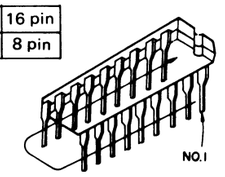
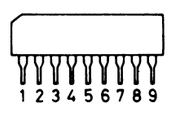
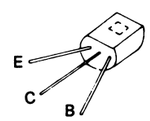
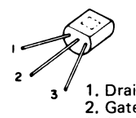
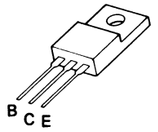
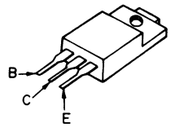
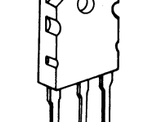
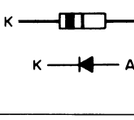
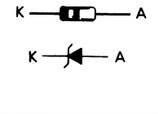
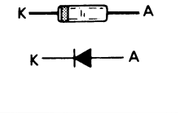
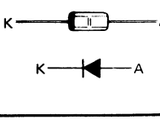
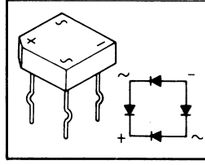
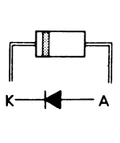
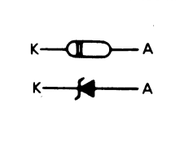
Notes:

1. **S1** : Input level selector switch in "**DC**" position. DC ⟷ normal
2. **S2-1 ~ S2-3** : Speaker selector switch in "**main**" position. S2-1: main, S2-2: remote, S2-3: main and remote
3. **S501** : Power switch in "**on**" position.
4. ▭ Indicated voltage values are the standard values for the DC electronic circuit tester (high impedance) with the chassis taken as standard. Therefore, there may exist some errors in the voltage values, depending on the internal impedance of the DC circuit tester.
5. ⟿ Phono signal lines of left channel.
6. ——— Positive (+B) voltage lines or negative (–B) voltage lines.

IMPORTANT SAFETY NOTICE

The shaded area on this schematic diagram incorporates special features important for protection from fire and electrical shock hazards. When servicing it is essential that only manufacturer's specified parts be used for the critical components in the shaded areas of the schematic.

• Terminal guide of transistors, diodes and IC's

MN1404STE, AN6552	MN1404STE: 16 pin AN6552: 8 pin 	SVITA7318P 	2SC1815, 2SC1845 2SA1015, 2SC2632 2SA1124, 2SA1370 2SC3467 
2SK117 	2SD1265 	2SA1306, 2SC3298 	2SA1301, 2SC3280 
MA162A 	MA1062M 	MA150, MA182 0A90AR 	MA27W–A 
SVDS10VB20F 	SVDSR1K2 	SVDMZ316, SVDMZ318, SVDMZ322 	

■ REPLACEMENT PARTS LIST .... Cabinet & Chassis Parts

Notes:
1. Part numbers are indicated on most mechanical parts. Please use this part number for parts orders.
2. Important safety notice:
   Components identified by ⚠ mark have special characteristics important for safety.
   When replacing any of these components use only manufacturer's specified parts.
3. The "Ⓢ" mark is service standard parts and many differ from production parts.
4. The parenthesized numbers in the column of description stand for the quantity per set.
5. Bracketed indications in Ref. No. columns specify the areas. Parts without these indications can be used for all areas.

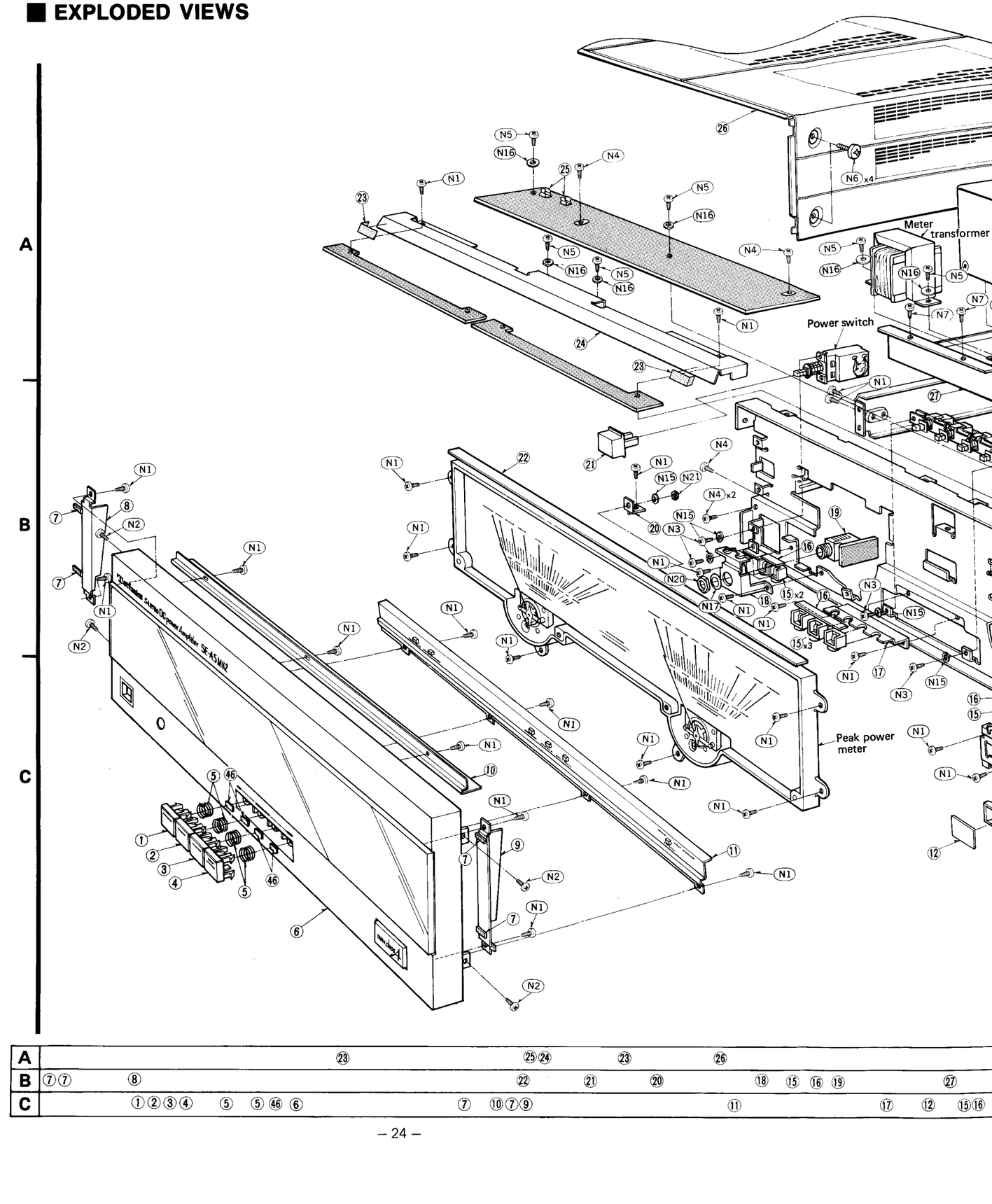
Areas
* [M] is available in the U.S.A.
* [MC] is available in Canada.

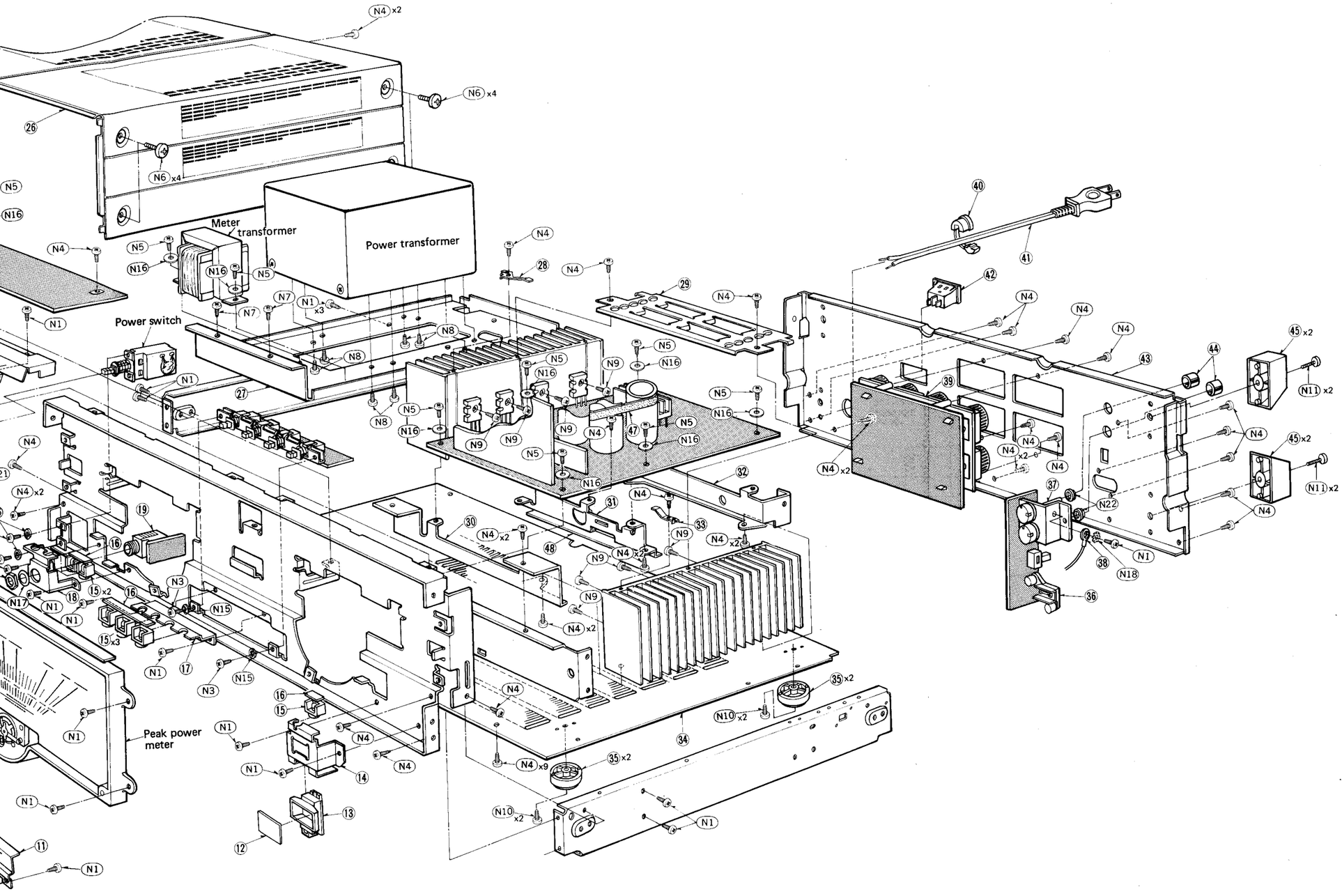
Ref. No.	Part No.	Part Name & Description
INTEGRATED CIRCUITS		
IC21	MN1404STE	ICQ Controller
IC101,102	SVITA7318P	Meter Drive
IC301	AN6552F	DC Servo
TRANSISTORS		
Q21~29,101, 102,313,314, 337,338,401, 503,505,601, 703,704	2SC1815−Y	Signal Detector, DC Detector, Indicator Drive, Regulator, Muting, Current Stabilizer, Bias Control, ICQ Control, Switching
Q301~304	2SK117−GR	FET Differential Amp.
Q305~308	2SC1815−G	Cascade
Q309~312	2SC1845−E	Differential Amp.
Q315~318,323, 324	2SA1370−D	Current Mirror, Pre Drive, Drive
Q319~322	2SC3467−D	Pre Drive, Drive
Q325,326	2SC3298A−Y	Class A Drive
Q327,328	2SA1306A−Y	Class A Drive
Q329~332	2SC3280−R	Power Amp.
Q333~336	2SA1301−R	Power Amp.
Q402,602	2SA1015−Y	Regulator, Relay Drive
Q501,502	2SC1845−E	Over load Detector
Q504	2SD1265−O	Regulator
Q701,702	2SC3467−D	Current Detector
Q705,706	2SA1370−D	Switching
Q707,708	2SC2632−R	Switching
Q709,710	2SA1124−R	Voltage Control
DIODES		
D21,22, 301~306, 501~506, 601~603, 711~714 Ⓢ	MA162A	Switching
D23	MA1062M	Zener, 6.2V
D307~310, 701~704	MA182	Switching
D311~318	OA90A−R	
D319~322	MA27W−A	
D401,402 ⚠	SVDS10VB20F	Rectifier
D409~412 Ⓢ⚠	SVDSR1K2	Rectifier
D413,414	SVDMZ316A	Zener, 16V
D507	SVDMZ318	Zener, 18V
D705~708	SVDMZ316B	Zener, 16V
D709,710	MA27B	
D715,716	SVDMZ322A	Zener, 22V
COILS		
L301,302	SLQY15G−30	Choke Coil
TRANSFORMERS		
T501 ⚠	SLT5S68	Power Source
T502 ⚠	SLT5L178	Meter
VARIABLE RESISTORS		
VR101,102	EVNK6AA00B32	Power Meter Adj., 300Ω(B)
VR201,202	EVH6UA524B54	Input Level, 50kΩ (B)
VR301,302	EVNK6AA00B13	ICQ Adj., 1kΩ(B)
THERMISTERS		
TH301,302	ERTD2ZHL333S	33kΩ
COMPONENT CONBINATIONS		
Z401~403 ⚠	SXRFS203ZSM	0.01μF(×2)

Ref. No.	Part No.	Part Name & Description
THERMAL DETECTOR		
PS501	SRPBG47101	
RELAY		
RLY601,602 ⚠	SSY124	Speaker
RLY603 ⚠	SSY9	Meter
LAMP		
PL1~18	XAMR74S17	Meter (12V, 0.055A)
PL19~21	XAMR48S230	Computer Drive, Safety Operation, Power(12V, 0.04A)
PL22~24	XAMR48T250	Speaker Ind. (12V, 0.04A)
METER		
	SSM161−1	Peak Power Meter
FUSES		
F1 ⚠	XBA1F80NU14	125V, 8A
F2 ⚠	XBA2F03NU100	250V, 300mA
SWITCHES		
S1	SSS49	Input Selector
S2	SSH475	Speaker
S3 ⚠	ESB9939T	Power Source
CABINET PARTS and CHASSIS PARTS		
1	SBC645−1A	Button, (off) (1)
2	SBC645−1B	Button, (main) (1)
3	SBC645−1C	Button, (remote) (1)
4	SBC645−1D	Button, (main and remote) (1)
5	SUS191−2	Spring, Button (4)
6	SGWEA5MK2−KM	Front Panel, Ass'Y (1)
7	SHG6349	Rubber (4)
8	SGE693−1	Bracket, Left (1)
9	SGE693	Bracket, Right (1)
10	SGE697	Reflector Plate (1)
11	SGEEA5MK2−KN	Ornament (1)
12	SDE259−1	Filter, Lamp (1)
13	SMP305	Case, Lamp (1)
14	SUW2155	Bracket, Lamp Case (1)
15	SHG1575	Rubber, Lamp (6)
16	SHP9379	Sheet, Lamp (2)
17	SMP293	Bracket, Lamp (1)
18	SMK61	Bracket, Headphone (1)
19	SJJ71B	Jack, Headphone (1)
20	SUW1955	Bracket, Meter (1)
21	SBC627	Button, Power Source (1)
22	SDU35−1	Filter, Meter (1)
23	SHS6129	Sheet (2)
24	SMP371	Reflector Plate (1)
25	SJT345	Holder, Fuse (4)
26(M)	SKCEA5MK2−KM	Cabinet (1)
26(MC)	SKCEA5MK2−KC	Cabinet (1)
27	SML101−1	Bracket, Power Transformer (1)
28	SUW2153−3	Bracket (1)
29	SMN1895−1	Bracket (1)
30	SUW1595	Bracket (1)
31	SUW1701	Bracket (1)
32	SUW1593	Bracket (1)

Ref. No.	Part No.	Part Name & Description
CABINET PARTS and CHASSIS PARTS		
33	SUW2153−2	Bracket (1)
34	SKU8210−3	Bottom Board (1)
35	SKL247−2	Foot, Bottom Side (4)
36	SJF3225−2A	Terminal Board (1)
37	SMN1729−1	Bracket, Input Level Volume (1)
38	SJT231	Terminal (1)
39	SJF4817	Terminal Board, Speaker (1)
40	SHR129	Bushing (1)
41 ⚠	SJA129−1	AC Cord (1)
42(M) ⚠	SJS9221	Socket, AC Outlet (1)
42(MC) ⚠	SJS9223	Socket, AC Outlet (1)
43(M)	SGP2391C	Rear Panel (1)
43(MC)	SGPEA5MK2−KC	Rear Panel (1)
44	SBN613	Knob, Input Level Volume (2)
45	SKL241	Foot, Rear Side (4)
46	SHG1509	Rubber, Button (4)
47	SHS2445	Sheet (2)
48	SHS2437	Sheet (1)
SCREWS		
N1 Ⓢ	XTB3+8BFZ	Tapping, ⊕3×8 (30)
N2 Ⓢ	XTS3+8BFZ	Tapping, ⊕3×8 (4)
N3 Ⓢ	XSN3+6S	⊕3×6 (4)
N4	XTBS3+8BFZ1	Tapping with Detent, ⊕3×8 (42)
N5 Ⓢ	XTN3+8B	Tapping, ⊕3×8 (12)
N6	XSSS5+12FIS	⊕5×12 (8)
N7 Ⓢ	XTB4+10BFN	Tapping, ⊕4×10(2)
N8	XTB4+8F	Tapping, ⊕4×8 (8)
N9	XTW3+12J	Tapping, ⊕3×12(8)
N10	XTB3+10FFZ	Tapping, ⊕3×10(4)
N11	XTB4+12FFZ	Tapping, ⊕4×12(4)
WASHERS		
N15 Ⓢ	XWA3B	Spring, φ3 (5)
N16 Ⓢ	XWG3	Plain, φ3 (12)
N17	SNE59−1	(1)
N18 Ⓢ	XWC3B	External Toothed Lock, φ3 (1)
NUTS		
N20 Ⓢ	XNS12	φ12 (1)
N21 Ⓢ	XNG3ES	φ3 (1)
N22	SNE4021	(2)
ACCESSORIES		
A1	SJP2239	Cord, Connection (1)
A2(M)	SQF12032	Instruction Book (1)
A2(MC)	SQF12033	Instruction Book (1)
PACKING PARTS		
P1	SPP653	Polyethylene Bag (1)
P2	SPH211	Sheet (1)
P3	SPS4303−1	Pad, Bottom (1)
P4	SPS4305−2	Pad, Upper (1)
P5(M)	SPG4787	Carton Box (1)
P5(MC)	SPG4788	Carton Box (1)

■ EXPLODED VIEWS




Meter transformer
Power transformer
Power switch
Peak power meter

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